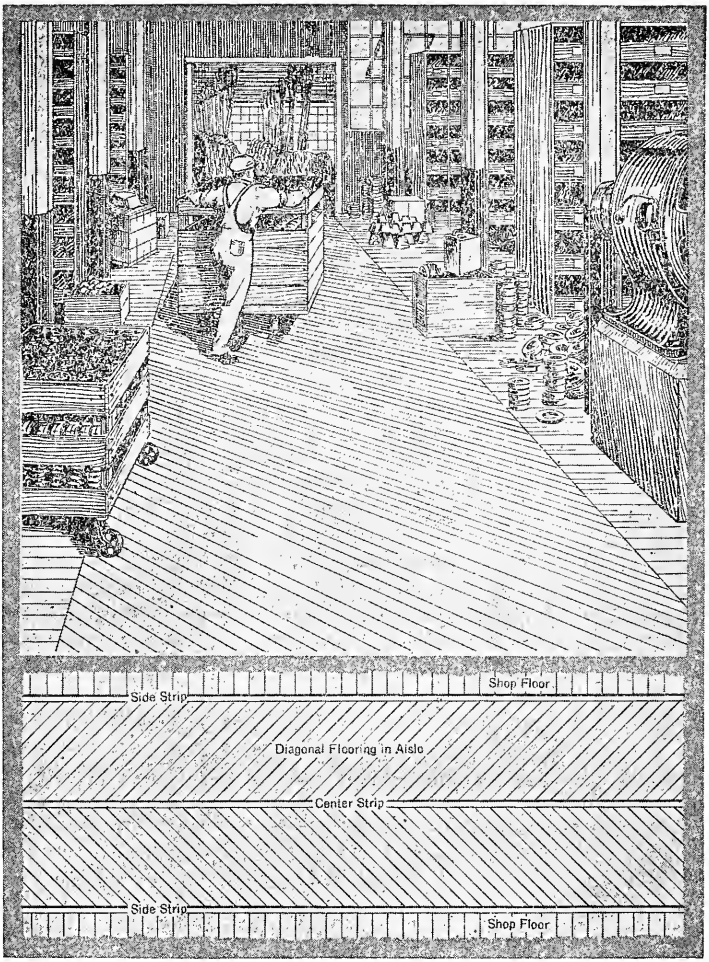
FACTORY'S PLAN-BOOK SERIES

# PRACTICAL WAYS TO CUT COSTS




## GETTING BETTER WEAR FROM FACTORY AISLES

Because aisle flooring quickly wears out if laid at right angles to traffic, one Canadian plant adopted the "herringbone" construction shown in the small sketch. An adaptation of the same idea appears in the larger picture—a view in the Westinghouse Electric and Manufacturing Company. The first plan has the advantage of permitting continuous use of at least one side of the aisle even while repairs are under way. However, the main advantage—longer wear due to placing the planks diagonally—is retained in the arrangement shown in the larger view. In either case, ready-cut lengths kept in stock make repairs quick and easy. It is interesting to note that the Westinghouse plan was suggested by the smaller diagram which had appeared in FACTORY some time before

# PRACTICAL WAYS TO CUT COSTS

BY THE READERS OF FACTORY, THE MAGAZINE OF MANAGEMENT, WHO, OUT OF THEIR EXPERIENCES, HAVE CONTRIBUTED THESE 162 IDEAS TO THE COMMON FUND

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# CONTENTS

## PREFACE

IF, in opening this book, you expected to find a treatise on the *theory* of cutting costs, you are doomed to disappointment. If even you expected a discussion of cost-cutting principles, or of governing requirements, or of factory responsibilities for economy, you had better lay the book aside at once.

For here, in fact, is not—in the ordinary sense of the word—a "book" on costs at all; but a set of actual cost-cutting *tools*, arranged for convenience in bookish form but each an independent, sharp-edged instrument, to be lifted out and put to work as the occasion requires, just as a drill or chisel is requisitioned from a stockroom.

Therein, the editors feel, lies the strength of this little publication. Stripped of every spareable word of description, you have, packed into these pages, 247 plans; practical, because each one has passed the test of actual use; adaptable, because chosen with a view to general application to a wide variety of plants.

The plans are taken from the pages of FACTORY, the Magazine of Management, in which the regular department, "Practical Ways to Cut Costs," is perhaps more eagerly followed by its 50,000 readers than any other feature of the magazine.

FACTORY is a current companion text to this book. To have found a usable idea from the book is the best evidence of what can be found each month from the pages of the magazine.

## CONTENTS—SECTION I

## FACTORY LOCATION, CONSTRUCTION, AND CONSTRUCTION DETAILS

## SECTION I

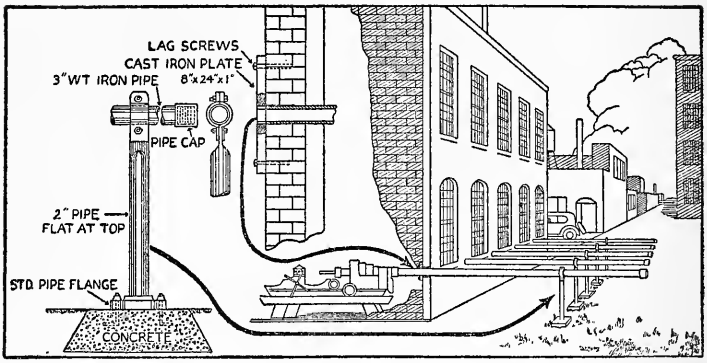
# FACTORY LOCATION, CONSTRUCTION, AND CONSTRUCTION DETAILS

### "LOOPHOLES" THAT ENLARGE THE PLANT

THE interesting layout illustrated on the next page was the result of a rearrangement of heavy lathes in one plant in order to obtain better use of floor space. The raw material run through these lathes consists of long bars.

At first it seemed practically impossible to make the arrangement desired and at the same time take care of these bars because they are so long. Enlarging the factory itself was out of the question. It was finally decided to make out-of-door space take care of the long bars. They made a hole in the exterior wall opposite the head of each lathe and set in this hole the end of a 20-foot length of three-inch cast-iron pipe. This pipe extends out into the factory yard space that is otherwise unused; so that taking advantage of this space without adding a roof or other construction was clear gain to the factory from a space point of view.

The outer end of the pipe was closed by an ordinary pipe cap and near the end it was supported by a post of two-inch iron pipe flattened at the top and imbedded in a concrete base. In use the pipe is "loaded" through the head stock of the lathe and the material is as well protected as though it had a factory roof over it. The pipe is weather-tight as well as strong and no harm can come to the stock while it is thus




**HOLES IN THE WALL ADD PART OF A BUILDING**

**You don't have to use inside floor space for the long bar stock you're working on. Pipes set in the wall opposite each lathe head can be arranged so as to use outdoor space for this stock**

protected. No doubt this method will suggest a solution for many a rearrangement that is wholly desirable except for the fact that long stock cannot easily be taken care of. G. S. F.

### A USE FOR WALL BOARD IN THE PLANT

ONE Rochester factory has used wall board in a way that may suggest possibilities in other plants. By running this board up to a height of seven feet it makes an excellent partition for enclosing a locker room made out of one end of a large manufacturing area.

The same factory has found that it works out rather well for filling in the space under low railings when it is desired to make these low dividing walls solid or fence enclosures for marking off small shop offices. Another firm uses wall board to build safeguards around machines or belts.

Innumerable places throughout the plant and the offices undoubtedly will occur to you where inexpensive partitions will be of service, and which can be fixed up attractively with wall board.

When used for this purpose it is well to remember that the framework should be rigid and the individual panels within the frame of not too great an area. This will insure a more lasting job. E. R. S.

### A CONVENIENT WAY TO LOCATE THE DISPENSARY CABINET

IN one Buffalo plant two rooms used for medical purposes are adjoining. To make one dispensary cabinet serve both rooms it was built to fit into the wall between them.

The doors opening from the cabinet into each room are of frosted glass, so the privacy of each room is maintained unless it happens that both doors are opened simultaneously.

With this arrangement, only one cabinet suffices and one set of supplies serves both rooms. L. I. T.

### ECONOMIZING SPACE WITHOUT CRAMPING

A FACTORY office some time ago became so crowded for floor space that the management was obliged to cut the caller's waiting or reception room in half.

This it did reluctantly, because the concern had always prided itself upon its attractive and comfortable waiting room. After the change had been made it was found difficult to rearrange the furniture in the room without overcrowding the place. The long table which had always stood in the middle of the room gave particular trouble.

To satisfy the need for this table, without crowding everything else out of the room, the office manager removed it from the room entirely and had the carpenter build a shelf along two walls of the room. On this shelf are placed all the office materials which were usually placed on the table. Chairs are placed in front of it and do not interfere with the caller who stands up to use the shelf to write.

The room accommodates as many callers as before and presents fully as attractive an appearance. The needed office space was obtained with little effort or cost. N. H. S.

### USING FRAGILE GATES IN EXITS

EVERY factory has a number of departments which it is desirable to separate from the general run of the plant. Some kind of barrier is required. At the same time, from the safety viewpoint, the means of exit must not be disturbed. This situation is interestingly met at the plant of the Northern Electric Company by using what it calls "fragile" gates.

They are of slat construction, and made of light-weight material except the frame, which, of course, is heavy enough to be serviceable. Besides being made of light-weight material, these slats are fastened only at the top and bottom. In this way safety is doubly insured. Even girl employees would be strong enough to rip them off in case of emergency. L. I. T.

### TUNNELS THAT AID PRODUCTION

FEW manufacturers have an adequate conception of the use to which the space beneath their plants can be put. The Studebaker Corporation, in its new plant at South Bend, has realized, at least in part, on the value of this space.

Beneath this plant it has constructed two sets of tunnels: a tunnel for carrying, through pipes, all manner of fluid and gaseous material, and a tunnel for carrying waste and scrap to the scrap room. Manufacturers too often bury the pipes which convey heat, water, oil, gas, and so on, to the various parts of the plant. The space through which these pipes run, however, is often little larger than a sewer pipe. When a break occurs or a leak starts in one of these

conveying pipes, the ground must be dug up; sometimes a floor or a road-bed torn up. All this causes waste of time and material.

In preparing their plans, the Studebaker officers allowed for a tunnel with an 8-foot ceiling and wide enough to allow a man to pass the whole length of it with comparative ease. In case of accident or leakage it requires but a matter of moments to locate the trouble and to set workmen to remedying it.

The second tunnel system runs beneath all rooms of the making division of the plant. It is equipped with a conveyor. At regular intervals in the floor of construction rooms are found openings which lead directly to this conveyor. Filings, grindings, sweepings and rejected parts thrown down these openings land upon the carrier and are at once conveyed to the scrap pile. This not only does away with much hand labor but relieves the workmen of the constant annoyance of trucks passing through to gather up scrap. O. L. J.

## IT PAYS TO ADD "LIST OF MATERIALS"

IT is customary in the building industry to have the list of material placed upon or accompanying the drawings. This practise is not so common as it might be in machine shops. The works manager of the Bickford Machine Company of the Greenfield Tap and Die Corporation has a great many jigs and fixtures to make for the other plants of the corporation. He finds a bill of material quite handy if it is a part of the jig or fixture drawing.

In the first place, it saves him from making out such a bill himself. He had to do this before he had the list put on the blueprints. In the second place, adding the list to the drawing in the drafting room, saves time. The draftsman, in order to draw the fixture, must necessarily know what material is going into its

and what facing and finishing operations are necessary. So it will take him very little extra time to put them down.

At the shop, the list on the blueprint is found very convenient. The stock clerk can take his blueprint, collect the necessary material and put it all in the compartment or rack of the bench which is to be devoted to that particular job during its presence in the shop.

In this way, a clerk or shop keeper can pick out the material instead of having the works manager or an expert mechanic, who knows material and can prophesy processes, spend his time at such work. P. F. O'S

### MAKING COAT HOOKS PORTABLE

THE foreman or superintendent of a department sometimes acquires an office ample in most respects, but not furnishing a good place to take care of coats or hats properly. Indeed, this is true of many places in the works where outer garments are laid aside.

The superintendent of one department of the Federal Rubber Company was so situated as far as office space went that his files and some other apparatus which he had to have handy occupied the entire wall space. It was impossible to arrange coat hooks any place in the little room except where they would be too high to be of use. He overcame the inconvenience, and he and his assistants keep their coats and hats in good condition in the following way:

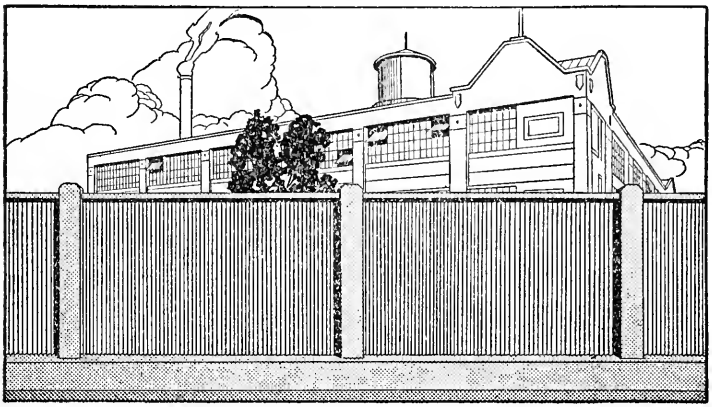
Each man has a board about six feet long and five inches wide. On this board are several coat hooks spaced one above the other. Through the top of the board is a hole, by means of which it can be hung on to a spike in the wall just under the ceiling. When a man wishes to hang up a coat or hat, he merely reaches up, takes down the board, places his wearing apparel

on the hooks, and rehangs the portable coat hook board on the nail high up on the wall.

The clothes do not clutter up the small office, yet can be stowed away on short notice and are easily accessible. This arrangement can be applied in a great many places, such as are found in any plant where lower wall space is at a premium, but where there is plenty of room up above that can be properly utilized. C. L. A.

## FENCING WITH CONCRETE

NEW uses are continually being found for concrete in connection with manufacturing plants. Many of these new uses combine practicability with good looks. An example of this is brought out in the



**A FENCE THAT DOES NOT GIVE TROUBLE**

Weather conditions don't affect it and it really gives the factory the isolation from the outside that is essential in some plants. Corrugated iron was used for the molds in order to produce the rough surface that's presented to view

illustration reproduced here. This factory is isolated from the surrounding part of town by means of the concrete fence. At the same time the effect is pleasing. In pouring this concrete, corrugated iron forms

were used and the resultant design adds considerably to the appearance of the whole work. T. R. K.

### A PICKET FENCE IN A FOUNDRY

AN iron foundry is so big and open that its spaces suggest the out-of-doors. Perhaps it was this spaciousness which suggested the use, in the stockroom of the Chapman Valve Manufacturing Company, of picket fences to partition off the cribs of the stock department from the adjoining assembly and shipping departments.

These 7-foot fences are made of tall pickets that clear the floor by just a few inches. They are painted a battleship gray so that they present a very neat appearance. It is the kind of barrier that is needed to isolate the stockroom crib.

All parts of the room are visible through the fence. It is possible for the superintendent to see from any part of the building what is going on in the stockroom, the assembly room, the painting department and the shipping room.

There are no partitions to act as obstructions to good lighting, and the fence is a great deal cheaper than partitions. These are three advantages that the management cites in its stand for fences as being preferable to partitions. E. S. H.

### TWO DUTIES FOR A PIPE FENCE

WHERE pipes are used for rails or fencing, it is sometimes possible to double up on their value by making them serve two purposes.

An example of this is seen at some of the stations of the Northwestern Railroad. Here the pipe fencing on the outer edge of the platforms is surmounted at intervals by electric lamps. Instead of running

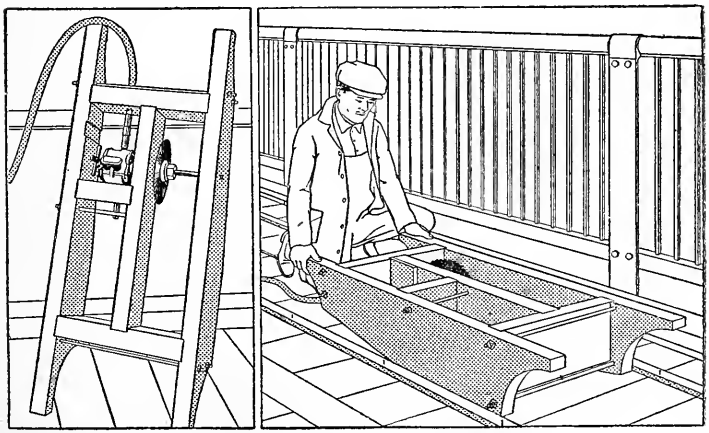
separate electric conduit to these lamps for carrying the wires, this company uses the top rail itself as a conduit.

Doubtless there are places, particularly about the factory yard, where the pipe fence can be made to serve two purposes. There may be cases even where, with the avoidance of future conduit in view, it will pay to recommend pipe construction instead of any other. L. I. T.

## PREPARING FOR NEW AISLE FLOORS

WHEN the heavy traffic along a factory aisle wears out the floor and repairs have to be made, if the flooring runs crosswise of the aisle whole boards have to be removed when only the ends projecting into the aisles are really worn.

Here is a plan used by the Connecticut State Highways Commission in removing a section of the first



HOME-MADE, BUT EFFECTIVE

This circular saw rig, used on a bridge flooring, would work well on the flooring of factory aisles. An air drill motor drives the saw. The operator can vary the depth of cut by "rocking the cradle." Lagging, nailed to the floor, serves as a guide

layer of planking from a bridge, which would work as well in a factory aisle flooring.

As the two illustrations show, the rather unique equipment consists of a circular saw driven by a pneumatic drill mounted in an oak cradle chamfered at one end. In this way the depth of cut can be regulated by rocking the frame slightly.

In using this rigging, lagging was tacked to the bridge flooring in advance to serve as a guide and allow the operator to give his entire attention to the working of the frame. V. O. W.

### GUARDING BENCHES FROM TRUCKS

OFTEN a careless trucker can do considerable damage. To prevent the truck from running into the bench when going around a corner, the Westinghouse Electric and Manufacturing Company places a floor guide made of ordinary two-by-fours.

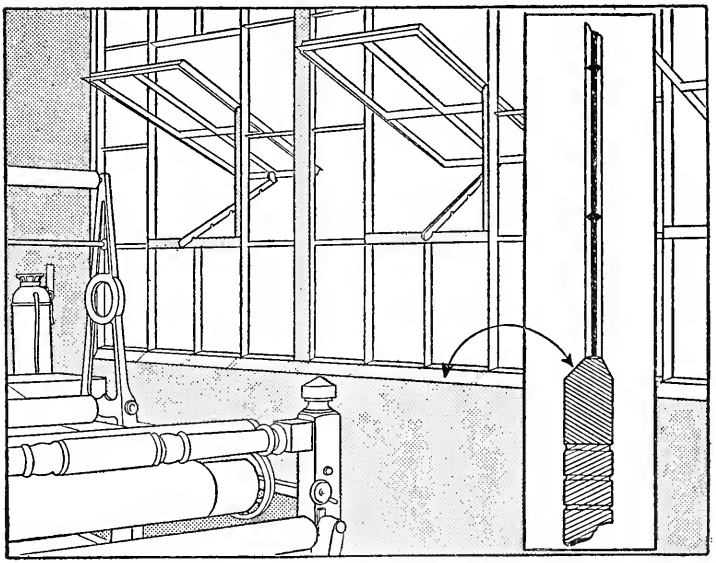
Machines which are located close to the corner of two aisles can be protected in much the same way.

In this same plant the pillars are protected by a plate of steel extending two or three feet above the floor in much the same way that telegraph and telephone poles are shielded. N. C.

### THE WAY TO KEEP TOOLS OFF WINDOW SILLS

IS there anything that gives the factory workroom a more untidy appearance than to have the window sills cluttered up with tools or rubbish?

When the Wilson-Jones Loose Leaf Company built a new plant, a short time ago, possible unsightliness from this source was done away with by having no window sills. That is, what sill there is slopes as the cross-section shows in the drawing reproduced on the opposite page. Incidentally the edge, sloped at considerable angle, has less tendency to collect dirt than



GETTING RID OF WINDOW SILLS

At the Wilson-Jones Loose Leaf Company, personal property and tools were often piled on the window sills. At the new factory it's impossible to block the windows

if it were an ordinary flat sill. Undoubtedly there are other places around the plant—the sloping tops of some modern clothes lockers come to mind—where simply by avoiding flat horizontal surfaces a great deal of the slack appearance that some plants present is automatically prevented. R. A. N.

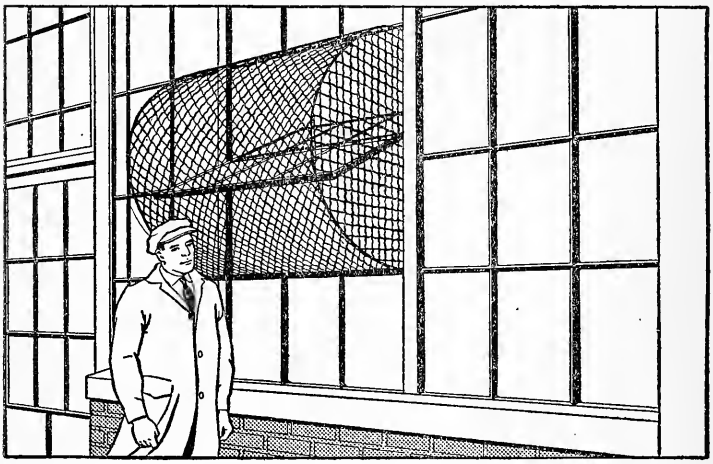
## SCREENS THAT PREVENT BROKEN HEADS

"HE was standing right there and when I swung the window open it hit him."

That's often the explanation of an accident that happens around a good many manufacturing plants.

It used to be in one particular plant that remedied the trouble in the manner here described. In this factory, screens were placed over all building windows

that are "head high," at least where these windows in the open position are likely to project into a passageway outside the building. How these are arranged and the need for them is evident from the illustration below.



PROTECTING THE PASSER-BY

Where steel windows on the first floor swing into a passageway head high, at the Packard Motor Company's plant, this screen prevents possible injury to anyone passing

Regular inspection, with similar hazards in mind, is more than likely to show up danger spots that, however, can easily be "denatured" by properly placed screening. L. I. I.

### A BOARD THAT PLANS NEW LAYOUTS

WHEN one of the plants of the American Laundry Machine Company found it necessary to enlarge, a convenient visible method of planning the changes in layouts which would result from the increased space was highly desirable. A planning board as shown in the illustration on page 46 was therefore built. The

layout had to show all the machines or at least all the groups of machines in the plant; this meant that it must be large. It is tipped off the vertical at an angle convenient for draftsmen to work at; a draftsman can reach any part of it with ease. At the same time the layout is more visible and legible than if it were a chart on the wall. The whole board is 18 feet long by 6 feet high.

Other necessary changes of layout will inevitably occur in the future. Therefore this board is always to be left as a standard part of the factory drafting room. The general outline of the building will also remain the same during many future changes of detail layout. Therefore those outlines of the buildings which could not be changed excepting by tearing down or highly expensive alterations are drawn in ink on heavy brown paper firmly fastened to the planning board. Fire walls, outside walls, elevator foundations and other permanent features are indicated by different colors of ink. Provision is made for inserting temporary outlines and titles to show the present location of each department; as anyone knows now these are permanent, but history shows they will probably not remain permanent in spite of present intentions. The machine groups and department names are drafted on small slips of white paper, cut out to fit into the outline of the building within which each unit is now located.

When it is necessary to take a drafting of a proposed or actual layout, a sheet of tracing cloth is laid over both the big brown sheet and the white inserts, and the cloth is inked as though from one solid drafting.

This board was found very useful in trying out several suggestions for re-arrangements incident to enlargement, and will be equally useful in the future.

P. F. O'S.

## CONTENTS—SECTION II

## SERVICE FEATURES AND FACTORY MAINTENANCE



*See also items in other sections:*

## SECTION II

## SERVICE FEATURES AND FACTORY MAINTENANCE

### USING ONE FAN INSTEAD OF FOUR

ELECTRIC fans are used only four months in the year, at the most. For two-thirds of the year they represent money invested with no returns. It is worth while, therefore, to try to place the fans in the offices and in the factory in the locations which will give the best results, and to determine with some degree of accuracy the size of fan necessary for a certain-sized room.

A western firm made a study of their cooling-fan requirements and to their surprise found that they could make 25 fans do where they had intended to purchase 150. They have about 150 offices all close together, with partitions between. Each office wanted a fan.

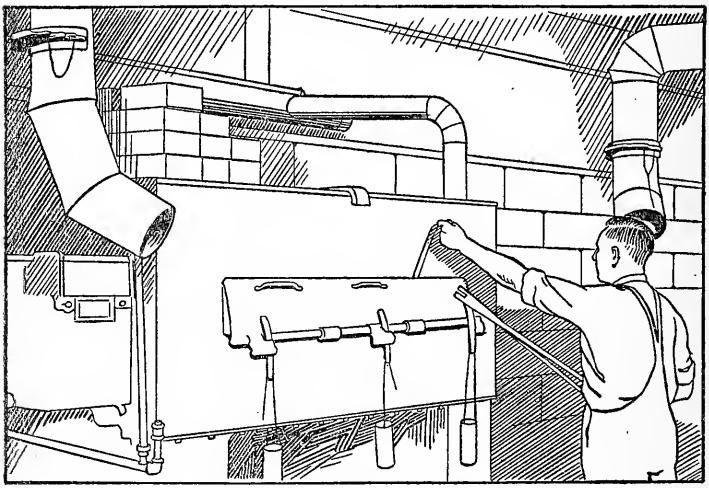
A careful study of fan sizes and types was made, and experiments were conducted to show the best locations in the offices. Holes were cut in the partitions between offices and rotating fans placed there so that one fan ventilated two rooms. In one case a rotating fan was placed in a recess cut in the walls at the corners of four offices and effectively served all four.

In this way it was found that about $1,000 could be saved because of the smaller number of fans needed, and the use of the most effective sort of fan in each instance. F. S. W.

### COOLING THE TEMPERING ROOM

THE steel-hardening room in a plant is ordinarily a hot place even in winter. In summer the conditions are of course even worse. In an eastern tool shop the heat was so bad that on the hot days of summer no work could be done at all. All through the hot season even the humane precaution of interrupting work on the warmest days did not prevent frequent idleness due to the men staying away from work a day or two at a time.

This manufacturing problem was overcome, and the room made fit to work in, by putting a fan in the side



HIS HEAD IS "AIR-COOLED"

Formerly the tempering room was unpopular in summer. Now a refreshing stream of cool air, head high, makes it a comfortable place

wall and from the aperture leading an 18-inch galvanized pipe about seven feet above the floor. From this branch, pipes discharge a stream of cool outdoor air across the middle of the room just in front of and above the furnaces, as shown in the illustration.

Now, when a man comes to the furnaces to take out work, his head is in the refreshing air. The stream also keeps the rest of the room comfortable by circulation and suction, the extra air being taken out through an opening in the opposite wall. The better ventilation has made a noticeable improvement in the willingness and ability of the men to work in this room. N. T. F.

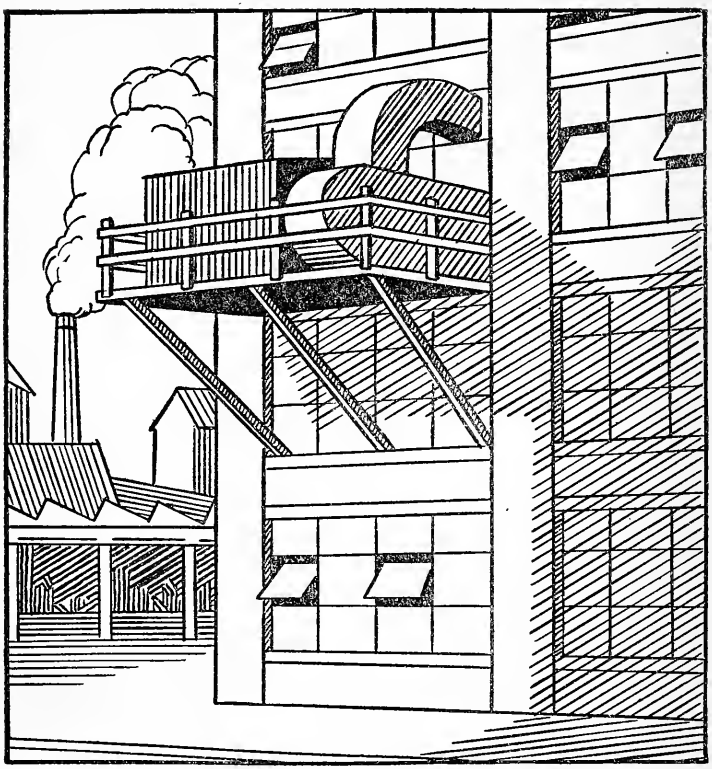
### WHEN TO WET COAL

SOME firemen use a great deal too much water in wetting down the coal; others do not use enough. It is difficult to provide just the right amount of moisture for every case.

Broad principles, however, may be laid down to the fireman, which will enable him to get much better results than playing the hose in a haphazard manner. As a rule, fine coal requires some moisture; even 13% or 14% will not be detrimental. The reason why this much water is better for fine coal is that unless the fuel comes in large pieces it is apt to pack and the fuel bed then becomes uneven. When the coal is larger, very little water, if any, need be used. Perhaps as good a rule as any is to allow no water whatever to be used on coal until the nature of each carload is known to and passed upon by some competent member of the engineering force. H. F. A.

### THIS FAN TAKES NO FLOOR SPACE

THE fact that factory floor space is usually at such a premium need not prevent the factory manager from installing a heating or ventilating fan even on that floor which seems to be so crowded. A bracketed platform constructed on the outside of the building makes an effective platform for the heating or ventilating equipment. The illustration on page 26 shows how this floor space problem was worked out and



NO SACRIFICE OF FLOOR SPACE

Where floor space is at a premium, the heating or ventilating fan is easily installed to a balcony, as was done at the Dayton Metal Products Company

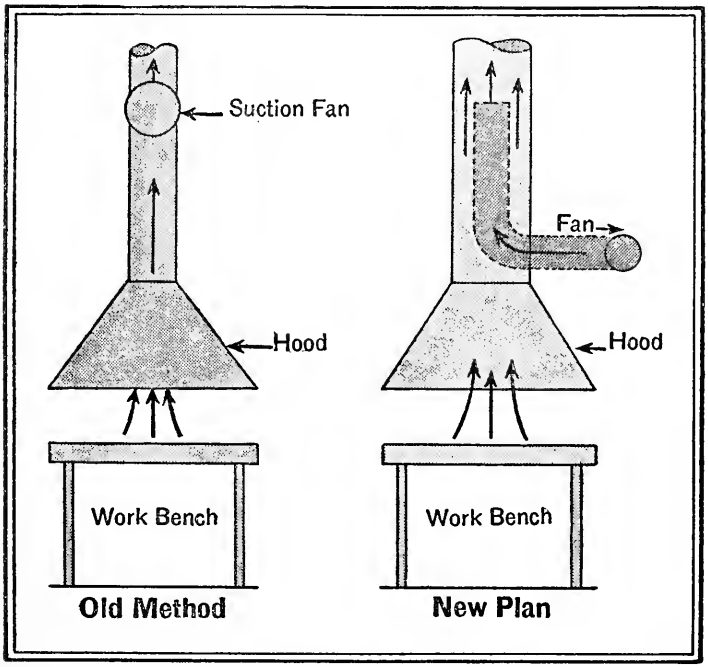
overcome at the plant of the Dayton Metal Products Company.

By building a stout railing around the platform that holds the blower, one obtains just as easy access to its working parts as though the whole equipment were installed complete on the floor inside. Frequently there are important additions to plant equipment that are not installed as soon as they ought to be, for the simple reason that one does not always recognize how available the outside of the plant really is for a

fan or blower that needs little attention. And the results are just as good—sometimes better—as if valuable inside space were given up to the new apparatus. N. T. F.

### KEEPING EXHAUST FANS CLEAR

IN a plant which utilizes the spraying method of painting parts of machines it is usually necessary to provide some method of exhausting the excess paint vapor, so that it will not settle in the factory and in the lungs of the workers. In one plant this was formerly accomplished by placing a hood over the painting




THIS PREVENTS TROUBLE FROM CLOGGING

Considerable time was wasted cleaning the vanes when the paint fumes were exhausted through the fan. Since re-arranging, as at the right, the fan does not clog up

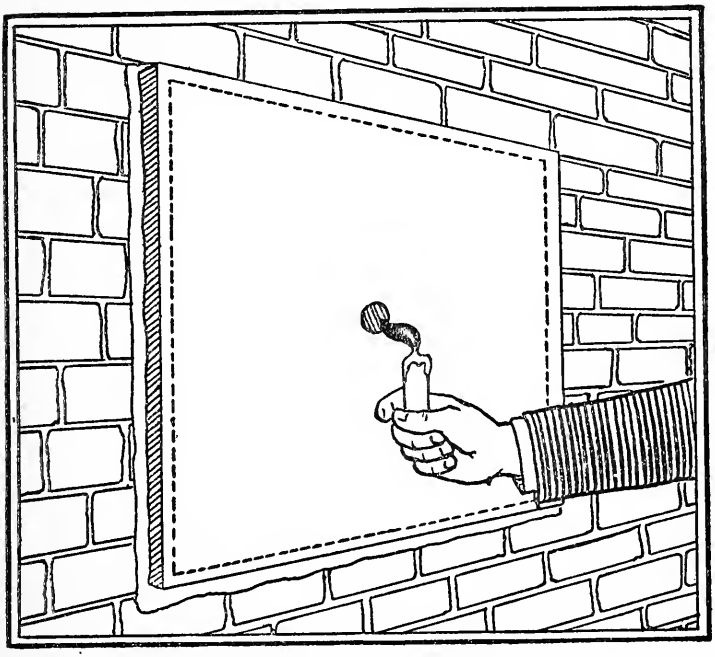
table, connected by a 10-inch galvanized pipe to a suction fan which drew off the excess paint and blew it into the atmosphere. This gave a great deal of trouble, as the paint accumulated around the fan and every few days it was necessary to shut down the paint shop while the accumulations of paint were soaked and scraped off. The expense involved was large. The problem being to keep the paint entirely away from the fan, the method shown at the right in the sketch on page 27 was evolved.

A larger pipe (about 14 inches in diameter) now leads from the hood to the outside air. Into this extends a 6-inch pipe which turns upward inside the large pipe. The fan as now used induces a draft in the large pipe, somewhat on the principle of an injector, which draws off the paint. In this way the paint is kept entirely away from the fan and as it is seldom necessary to clean the pipes, all shutdowns from this cause are done away with. E. D. F.

### DISCLOSING LEAKS IN THE BOILER SETTING

AIR leakage in a boiler setting sometimes appears such an intangible thing as to be neglected. Here is a way, however, to show up plainly whether or not your boiler settings are drawing in air where they should not.

The simple apparatus necessary to make the test consists of a candle and a sheet of paper, two feet square, glued to a wooden frame. In the center of the sheet is a hole one inch in diameter. Place this device against the boiler wall and with putty make the joints between the frame and the wall air tight. Then hold the lighted candle before the hole and note the degree to which the candle flame is deflected by the draft. Although the leakage may not be apparent without some such test as this the loss may be very real. It



A COSTLY CANDLE FLICKER

Make a paper-covered test frame like this and see if a candle flame is drawn into the inch hole in the center. If so, you may be sure you're wasting coal

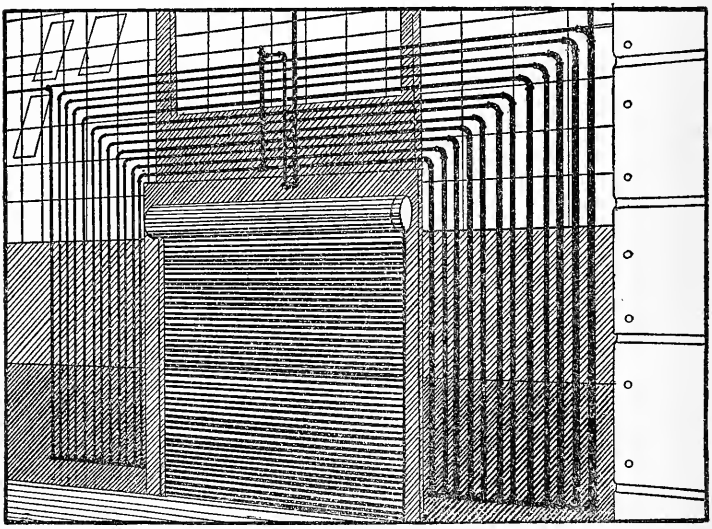
may be well to make tests of the boiler walls once a week to make sure that no new leaks have developed. The advantage of the idea here illustrated is its simplicity and its effectiveness in helping one visualize how much air is getting into one's boiler by "the back way." W. K. T.

## FIGHTING COLD AIR DRAUGHT

AS every factory manager knows, the place for heating pipes, everything else being equal, is in the vicinity of windows. In manufacturing plants, however, there are likely to be large openings such as elevator doors or perhaps wide doors opening from a

heated room into a colder one that in one moment allow a sweep of cold air to counteract nearly all the heating effect of properly placed coils near the windows.

Where this is the case the maintenance of an even temperature in the workroom is greatly facilitated by placing heating coils around these doors that are so



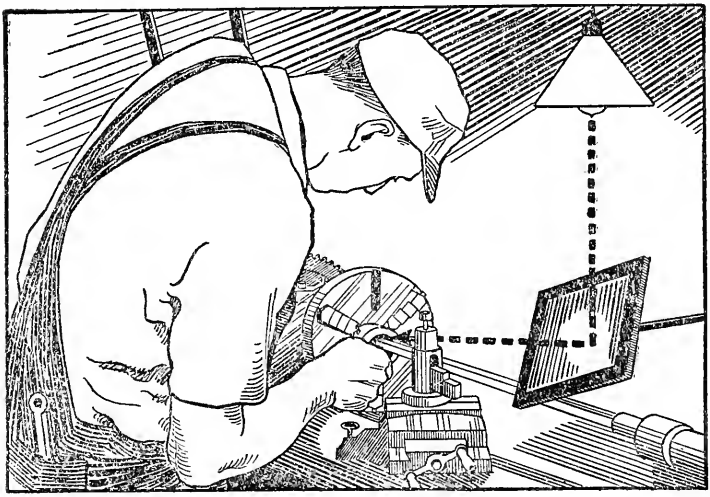
KEEPING A UNIFORM TEMPERATURE

Heating pipes like these around doorways and entrances help to neutralize the cold air which naturally comes in when the entrances are opened

liable to be frequently opened. The illustration above shows how this plan was carried out in the case of one plant. By nesting the pipes in this way in a flat plane, no valuable space is sacrificed and the heating effect is extended over a substantial area. C. W. T.

## LIGHTING ALL PARTS OF THE WORK

THE extreme difficulty of lighting the inside of work on a lathe so that the operator can see what he is doing can largely be overcome by the use of a



REFLECTING LIGHT INTO HOLLOW PARTS

Even with a good lighting system it is difficult to illuminate the interior of a cylindrical chuck-work. This mirror on a swivel joint supplants the drop-cord and extension light

mirror. An arrangement of this kind that worked out satisfactorily is shown in the picture above. The mirror is mounted on a swivel and the operator can throw reflected light into almost any corner of the work he happens to be on. This has proved far superior to using an extra incandescent light. O. S. E.

## MORE BENCH ROOM IN THE SAME SPACE

IF a bench is low, it's inconvenient to write on; if it's high it is not much good as a bench. Anyhow a bench, even a stockroom bench, isn't designed for a bookkeeper's stand-up desk, although there often is considerable writing to be done.

But, in one case, full advantage of both desk and bench was retained, and space saved in the bargain, by designing the little angle-iron frame pictured on the next page. If the angles are sufficiently heavy and

securely fastened, the writing shelf will be steady. While it is inclined for convenience in writing, a spring clip holds papers firmly in place—a blessing too on drafty days when the windows are open. The space under the shelf is utilized for holding the incoming and outgoing baskets.

A careful inspection of the illustration shows that the horizontal cross rod stretched between the two uprights

GETTING MORE OUT OF BENCH SPACE

Here is a handy little desk that allows full bench space beneath. The clip holds papers and the work is held at convenient height for making notations

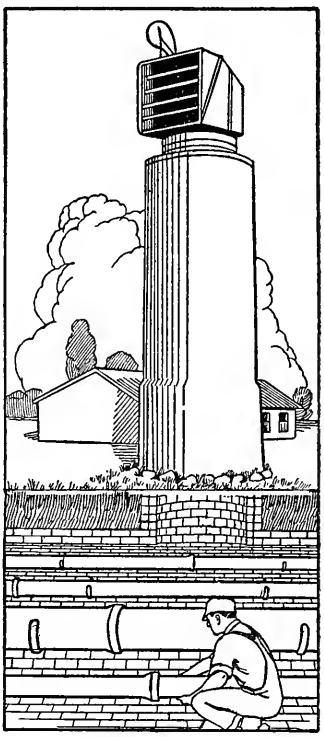
(at the arrow head) is supported upon two hook brackets. When wire is to be measured from a spool, it is handy to remove the rod and replace it as an axle on which the spool may turn. Out in the factory, in the more strictly production side of the work, a couple of spare angle irons similarly bent may do equal service. A. L. B.

## WHY NOT VENTILATE THE PIPE TUNNEL

OFTENTIMES tunnels are run between the various buildings of a plant to accommodate the electric cables, and the piping for steam, water, air, and so forth.

Usually no provision is made to ventilate these tunnels and in consequence working conditions within them are often very poor, particularly if gas is piped there and leakage occurs. The picture at the right shows how ventilation was secured by the Textile Machine Works, in a tunnel from its power plant to the factory.

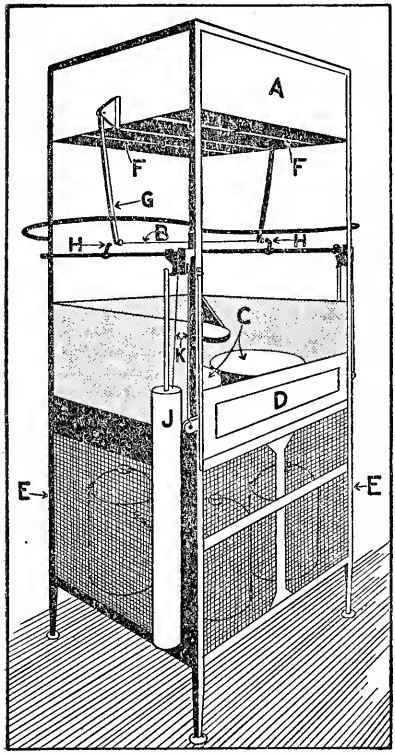
Such a vent, if at a considerable first cost, is likely to be a paying investment since it renders the tunnel more easily accessible and makes prevention, rather than an expensive cure, the order of the day. D. A. K.



THERE'S A PIPE TUNNEL UNDERNEATH

In order to keep underground pipes and cables in good condition, frequent inspection is necessary. This ventilating tower makes the tunnel liveable and inspection easy

## AVOIDING GASOLINE FIRES




A GASOLINE WASH STAND THAT'S SAFE

- A. Sand box
- B. Gun cotton string, rapidly burned by any flame
- C. Gasoline cans, for washing parts
- D. Safety door
- E. Gasoline storage
- F. Arms that hold bottom of sand box
- G. Rod (released when string burns) which lets bottom of sand box fall and releases sand; also hits trip (H)
- H. Trip which releases weight (J)
- J. Weight which raises safety door (D) by string (K) and pulley

Safety door protects operator and confines flames.

THE American Bosch Magneto Company had several accidents resulting from the use of gasoline in open containers. The need for some safety appliance became imperative, and the safety stand shown in the illustration here reproduced was developed by their engineers.

This stand is built up essentially of angle iron with a sand box on top and a compartment for gasoline and kerosene cans at the bottom. The working space is the center, about the same height as the average work bench from the floor up.

The upper compartment is filled with sand, which is held arrested by two trap-doors supported by a lever on each side immediately underneath the trap-doors.

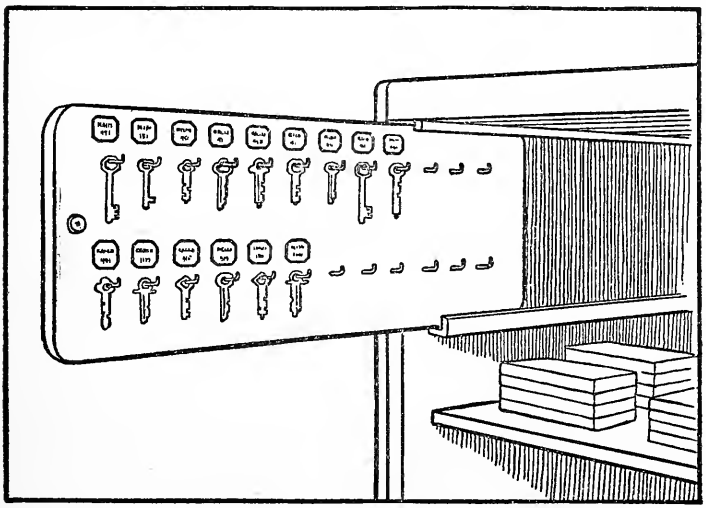
The long ends of the levers are connected

with a string of gun cotton. Should the gasoline become ignited through some accident, the gun cotton string will immediately burn through, thus releasing the two levers and opening both trap-doors, releasing the sand and smothering the flame. At the same time the sliding door in front will move upward, confining the flames inside of the compartment.

The adoption of these stands has done a great deal in the way of reducing insurance rates, and they have been the subject of much praise from insurance underwriters and state inspectors who have had occasion to visit the factory. F. W. B.

### KEEPING THE KEYS ON FILE

THE key rack shown in the picture below is in use at the plant of the Eastman Kodak Company. It consists simply of a board equipped with metal hooks, each one labeled. The board slides inside of



DO YOU EVER MISPLACE IMPORTANT KEYS?

If so, isn't it usually because you had no real place for them? This sliding key board can be made quickly by any shop carpenter after a glance at this illustration

a stationary cabinet which keeps it out of the way and yet enables it to be drawn out so that access is easy.

In most plants the keeping of keys is a difficult problem, but by some such arrangement as this, together with rigid rule that keys must be kept in their place, ordinarily the difficulty should be easily solved.

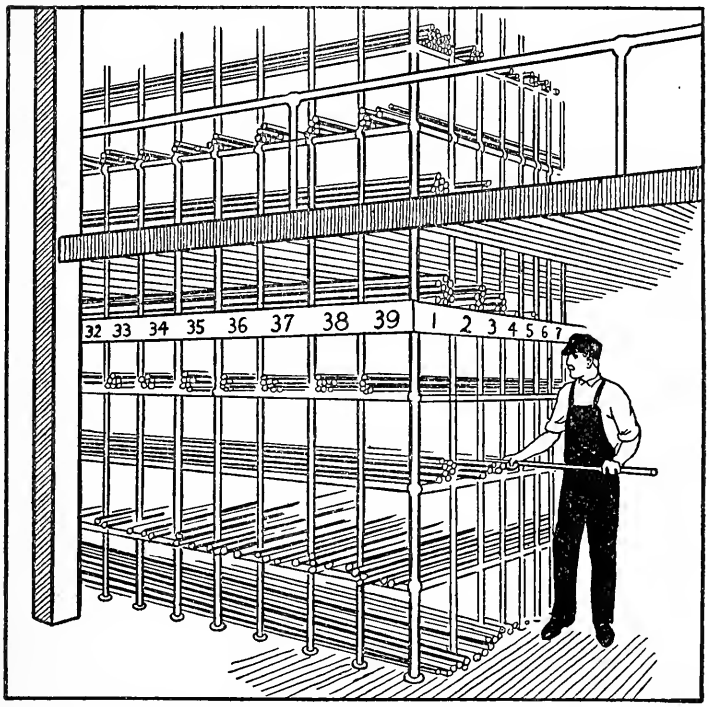
N. E. R.

### USING FOUR SIDES OF A RACK

THE ground floor of one factory storeroom of the American Laundry Machine Company has a steel rack 30 feet square, which is loaded from all four sides. The rack is built only of posts and cross-sills in two-foot meshwork. The odd-numbered tiers are used for steel bars laid horizontally east and west, while the even-numbered tiers are used for steel laid north and south. This makes the whole stack very firm, as any vibration that might start in it is neutralized. Even if the cross-sills which form the bottom of each compartment collapsed entirely, the steel itself would still hold firmly in the form of a stack.

When the location of any lot of steel in the racks is recorded on the index, the side of the rack where it will be inserted is specified by a letter N, S, E, or W. Following the letter a figure shows how far the designated compartment is from the left corner of the side of the stack and another letter shows the tier. A card will read, for instance, N7E, meaning that this steel is to be found on the north side of the rack, seven compartments from the left edge, in the fifth compartment from the ceiling.

Each compartment is made of a generous size to provide room for expansion in quantity of any one kind of steel and empty compartments are left for the same purpose.




CONVENIENCE AND ORDER SAVES TIME

This rack is so designed that piping can be stored like letters in a pigeonhole. Alternate layers lie at right angles to each other, and a systematic stock-numbering system enables the workmen to quickly locate the piping

Since men can load and unload from all four sides, this divides by four the chances that two men may want to occupy the same space at the same time.

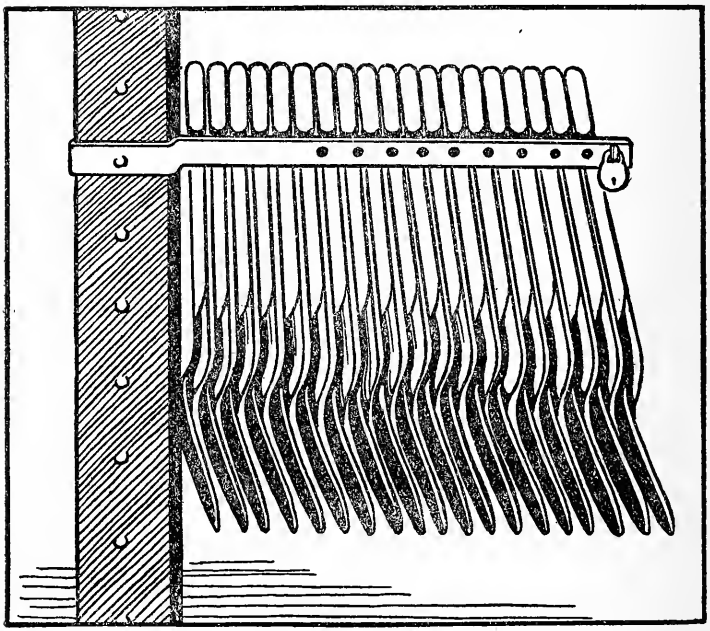
J. W. A.

## THESE SHOVELS DO NOT "LIE AROUND"

AN orderly shop means a great deal to a company; it means more contented workers, more and better work completed, less waste of material; the tools are kept in better shape and many accident hazards are removed. These are only a few of the advantages

accruing to a clean, orderly factory. A department foreman, in an eastern steel company, being well aware of these facts, presented an idea for a shovel rack, which was accepted and put into effect by the company.

The rack, as illustrated below, consists simply of two pieces of iron bent around, and bolted to, an I-



KEEPING SHOVELS OFF THE FLOOR

The foreman keeps the key to the padlock of this shovel rack, so he can keep close track of every shovel

beam, with enough space left between the protruding arms for the insertion of a shovel handle.

Ten holes bored in each arm, a drilled pin, and a padlock are the only means necessary for locking the shovels in the rack. Only the foreman can remove a shovel, so neither will there be complaints of stolen shovels, nor will shovels be lying around.

This rack is so simple that any shop can make it and avail itself of these advantages. The idea can well be used in other places. I. F. M.

### ELIMINATES VAPOR IN PROCESSING ROOM

THE elimination of vapor arising from open cooking kettles is always a problem in food packing establishments. In most instances ventilation of the room in which such equipment is located is depended on to remove the excess humidity. A large Illinois factory has met this issue successfully by placing outlet pipes on its kettles and operating an exhaust fan in connection with these pipes. In the photograph, on page 45, the motors which operate the fans are to be seen near the ceiling. Each exhaust fan handles the vapor arising from two kettles. Almost no vapor finds its way into the room where these cooking kettles are located. O. C.

### CATCHING DIRT FROM BELTS

MOVING belts gather and drop considerable dust, which cannot be permitted in food factories. Steps must be taken to prevent the dust falling from these belts into any open vats or trays.

In one plant the metal guard which covers the belt and prevents an accident from a broken belt is covered with canvas. This is fixed so that it can be removed easily and cleaned, and it effectively catches any material which will drop off the belt and prevents its getting into the food.

In still another factory wall-boards are used to cover the belt guard and catch falling particles. This, however, is not quite as good as the canvas guard in that it cannot be removed and cleaned as easily. J. N. R.

## CONTENTS—SECTION III

# MACHINERY, TOOLS, CONTROL EQUIPMENT, PRODUCING AND DISTRIBUTING POWER

## SECTION III

## MACHINERY, TOOLS, CONTROL EQUIPMENT, PRODUCING AND DISTRIBUTING POWER

### HOW WATER LEVEL AFFECTS OIL

THERE would seem no direct connection between the level at which water is kept in the boilers and the amount of oil used in the engine cylinders.

How one may affect the other, however, was demonstrated at one plant a short time ago.

It was suddenly noticed that much more cylinder oil than formerly was needed to lubricate the steam valve and piston properly on each engine. At first it was thought that perhaps the oil itself was the cause, but after an investigation the oil was found to be of the same grade as used previously. In looking farther, it was found that the water in the boilers was carried too high. This caused excessive quantities of water in the steam, which in turn washed the oil from the working surface of the valves and pistons, making it necessary to use much more oil. After the water level was reduced, much less oil was used.

Such a condition ought never to be found in any plant. The only excuse for too high water level is a single feed-water pumping installation that cannot be depended upon. The owner cannot afford to run such a risk. Duplicate pumps are called for. If excessive cylinder oil results in the installing of proper feed-water equipment, the oil loss is not a loss, but a gain. H. A. J.

### PROTECTING HOSE LINES

IN the growth of a manufacturing plant it often happens that it is necessary to use air or steam lines in a part of the building where no use was necessary when the building was built and where no pipes have been laid. It is usual in such cases to run rubber hose to the place where the air or steam is needed, often across aisles which are used by trucks.

One manufacturing plant met this problem by installing U-shaped channels, with triangular filler cleats on each side of them, to carry the hoses across the aisles. Trucks run over these easily and the air hose is protected from damage and interruption of service. F. T. H.

### THIS PLAN PREVENTS SHUTDOWNS

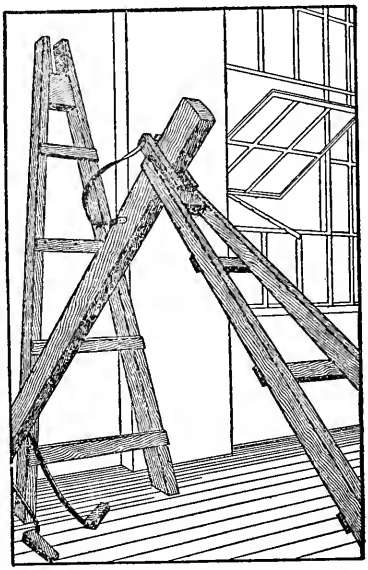
IN using pulverized fuel, trouble is sometimes experienced in linking up the action of the motors driving the blowers and those running the fuel supply conveyors. At one industrial power plant, trouble of this kind resulted in the shutting down of part of the plant, and the fires in some of the boilers went out. It was found that the blower motor had stopped for some reason and the screw conveyors feeding the powdered coal to the boiler had continued until combustion stopped.

It is necessary, in order to produce the instant combustion of the powdered coal when entering the fire chamber, that the proper mixture of air and the coal particles be maintained. This difficulty was overcome by providing a magnetically operated switch with the magnet coil connected in the circuit of the motor driving the coal feed conveyor. Any interruption of current in the magnet coil opens the conveyor motor circuit. The conveyor then stops until the trouble is remedied and the fan is operating properly

With this device in use, the possibility of choking the fire box with an excess of coal when there was no air supply was eliminated. When the screw conveyor stops it is immediately noticed by the employees and the trouble is rectified. T. W. B.

### A HORSE YOU CAN "KNOCK DOWN"

A CONVENIENT home-made horse—shown below—for supporting staging and so on, was designed by the superintendent of power of a large Massachusetts textile mill. It consists essentially of a 3x5-inch timber, seated, near its ends, in the forks formed at the tops of two pairs of legs. The latter are $1\frac{3}{4}$x$2\frac{1}{2}$ inches in size. They and the main timber are spruce. The cross timber is 8 feet long and is carried 7 feet above the floor when set up. By using a duplicate horse a most convenient temporary platform may be put up at any desired point in the mill.



THIS HORSE TAKES UP NO ROOM

Uses for a horse are so varied and frequent that it pays to have one on hand that can be knocked down

The timber cross-piece is held in the fork of each pair of braces by maple wedges 12 inches long, 1 inch thick, $1\frac{1}{4}$ inch wide at the bottom and 2 inches wide at the top. Horizontal cross-bracing of 2x$\frac{7}{8}$-inch stock is fastened to the legs. The wedges are equipped with 1x3-16 inch leather straps which greatly facilitate their handling

and prevent losing them when the horse is knocked down. The forks are lined with 1x2-inch blocks screwed to the legs. These take up the wear, when the wedges are inserted and removed many times, and are easily replaced. H. D. H.

### DOES YOUR BOILER SCALE?

ALL boiler scale results in fuel loss. To get an idea of what the United States Fuel Administration found to be true when boiler scale was present, the following table is called to the attention of those having charge of boilers:

| Average Thickness of Scale | Coal Wasted from Every Ton Fired |
|---|---|
| 1/50 inch | 100 lbs. |
| 1/32 " | 140 " |
| 1/25 " | 180 " |
| 1/20 " | 200 " |
| 1/16 " | 220 " |
| 1/11 " | 300 " |
| 1/9 " | 320 " |

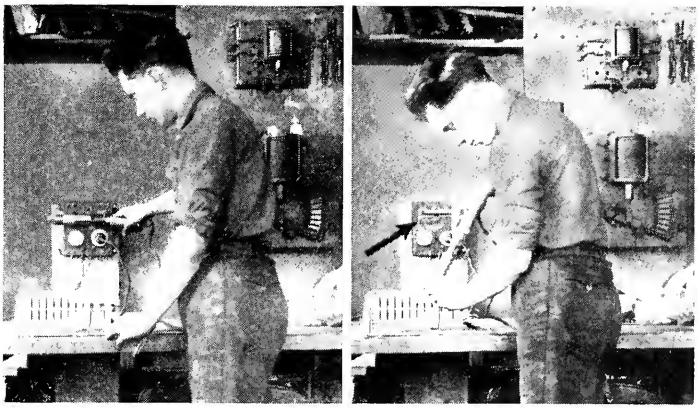
From the right-hand column and from the engineer's knowledge of the approximate thickness of scale on his boiler, he can figure his loss in dollars and cents. And if he does not he is liable to be startled to such an extent that he will remedy the trouble.

M. I. B.

### MAKING AN AIR COMPRESSOR PORTABLE

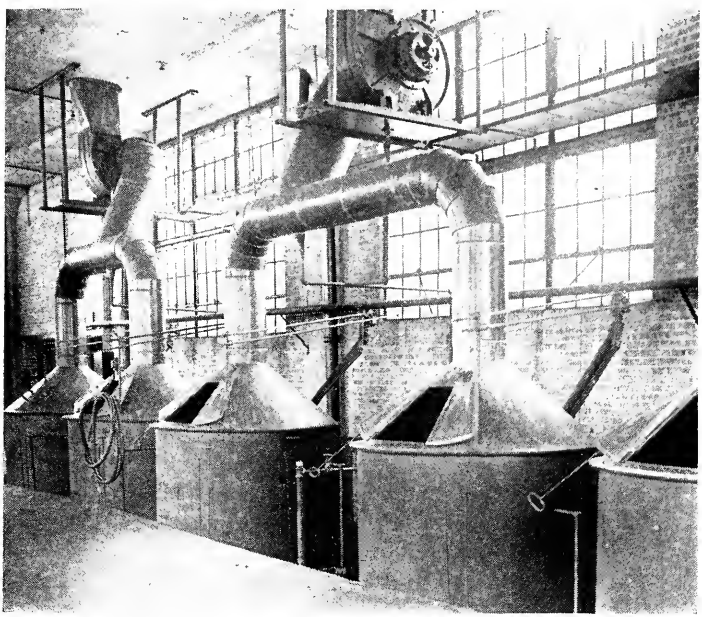
COMPRESSED air is being used with marked success to clean machinery. It is not, however, always convenient to run air pipes with nozzles in handy places for the hose connections.

One factory superintendent, faced with this problem, met it by the use of a lift truck.



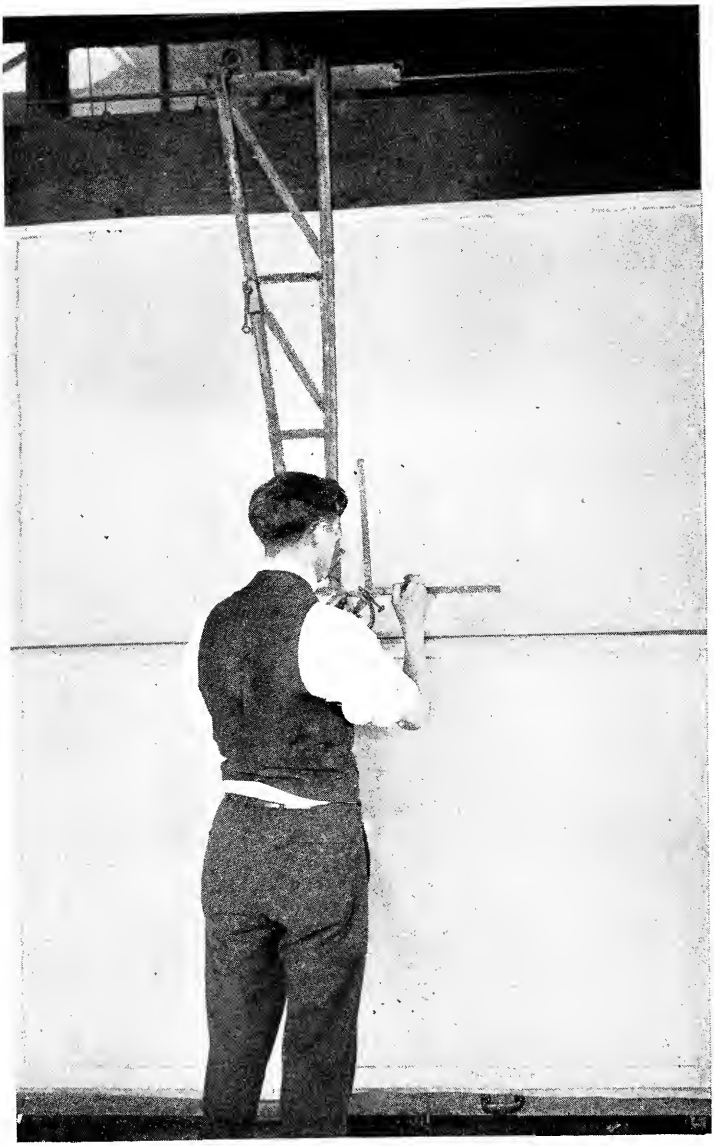
NO OVERHEATED IRONS HERE

This prevents overheating, eliminates the fire hazard—and still keeps the iron hot.
See page 47 for item



GETTING RID OF COOKING VAPORS

An exhaust fan, serving each pair of kettles, keeps the atmosphere of the room free from excess humidity. See page 39 for item



PLANNING FACTORY CHANGES

On this large layout board new layouts of machinery or changes in plant construction can be conveniently studied. See page 20 for item

"I mounted an electric motor, air compressor, and air tank upon a pair of skids," he explained. "Over the whole I had rather a sharp-angled roof built.

"While this roof forms something of a protection for the equipment from anything falling upon it, its real object is to provide two slanting surfaces into each of which are driven three pegs. On one of these slanting surfaces, around the pegs, the air hose is coiled and on the other surface is the electric lead for the motor.

"Then there's a connection for inflating pneumatic tires. And while we were about it we put on a compressed-air whistle."

The idea of making your compressed air portable, as explained here, is a sound one that can be applied to good advantage in many other plants where compressed air is needed in small amount and in widely spaced localities. H. H. O.

### PROTECTING SOLDERING IRON

ELECTRIC soldering irons which are left to lay on a bench or other convenient place when temporarily not in use, gather dirt and become a fire hazard. Often the tip will be overheated, necessitating refiling; the heating unit may burn out; or the hot iron set fire to the bench or other material. If the current is turned off, the iron cools down to such a degree that considerable delay is caused when the iron is wanted again.

To overcome these objectionable features some concerns are using an automatic soldering-iron rack and control panel like that shown in the picture on page 45 which decreases the amount of current taken by the iron when it is placed on the rack.

The rack itself consists of a small slate panel arranged for wall mounting and carrying a support for the iron

which acts on the principle of the telephone receiver hook. When the iron rests on the support or hook it bears the support down and resistance which is mounted on the back of the panel is inserted in circuit with the iron. The current is reduced and the temperature held at a safe figure, but ready for service and full current just as soon as the iron is lifted from the hook.

Taking the weight from the hook disconnects the resistance from the soldering-iron circuit and allows full current to flow. Below the hook, on the same panel, is a push-button snap switch and a standard receptacle to which the plug of the soldering-iron cord is connected.

This little panel is a complete switch-board which may be mounted on the wall or machine within reach of the workman. When not in use, and at night, the switch is snapped off, which completely opens the circuit to the iron. C. H.

### TAKING THE SHAKE OUT OF MACHINERY

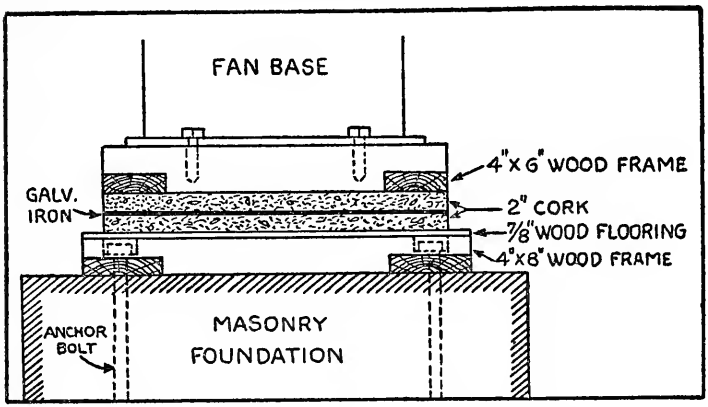
ONE of the phenomena most difficult to eliminate in connection with factory work is the vibration due to heavy machinery. Considerable progress has, however, been made along this very line.

There are really two kinds of vibrations set up by machinery. One is the vibration through the air and the other through the foundations of the machine.

Foundation vibrations are likely to affect the structure of the building in time, and even if they do not, they constantly annoy by the shaking which they cause throughout parts of the building.

While it is comparatively easy to reduce foundation vibrations to some extent, the job must be done right if it is to last.

Layers of insulating material are commonly placed between the base of the machine and the masonry




HERE'S ONE WAY TO "CALM DOWN" A FAN

Vibrations from large ventilating fans shorten the life of the fan. To reduce these vibrations a good method is to build up an insulating base of wood and pressed cork as shown here

foundation to absorb in some measure the vibrations set up by the base of the machine. A typical arrangement of this kind, recently shown in one of the engineering magazines, and which is adapted to fans, motors, small engines, and the like, is indicated in the sketch reproduced above.

This arrangement is designed for the support of a large ventilating fan. It consists of a frame made up of 4x8-inch soft pine timbers floored over with $\frac{7}{8}$-inch pine boards upon which are placed two layers of 2-inch pressed cork. These layers of cork are separated by a sheet of galvanized iron. The fan base is screwed to a hard pine frame which rests on top of the cork, while the whole insulating layer is separated from the concrete foundation by 4x8-inch pads made of 1-inch piano felt placed 3 feet apart.

It should be noticed that the anchor bolts pass through the insulating frame only and do not come in direct contact with the fan base which is secured to the wooden framework by separate lag screws.

This is one of the main principles to be kept in mind in this kind of work; namely, that anchor bolts must be kept as much as possible away from the direct foundation of the machine. Otherwise, considerable pulsation is carried in the bolts themselves, no matter what other insulation you may have.

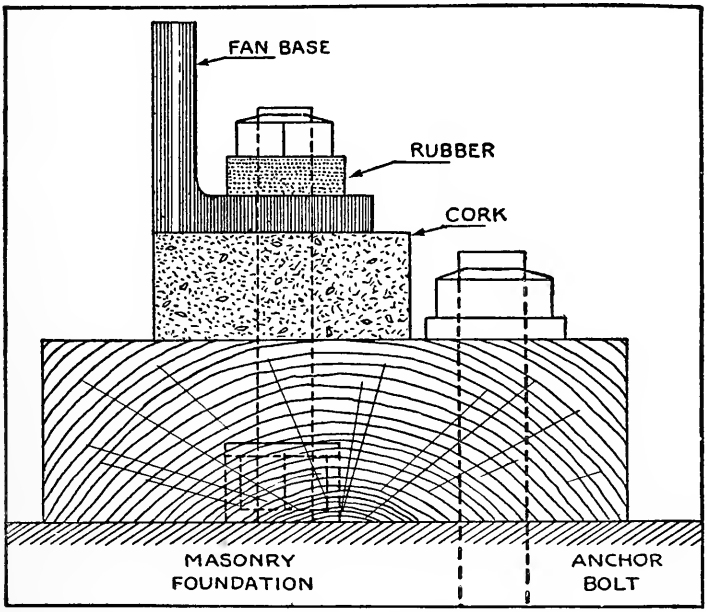
It is safe to say that in a large majority of cases a little initial expense used in properly insulating this type of machinery pays for itself in the long run in the better preservation of the structure of the building. And besides, there is the constant advantage of freedom from shaking in turning out the product of the plant. F. H. W.

### SAVING TIME-CLOCK MINUTES

AT the plant of the Richards-Wilcox Manufacturing Company, a guard, in the form of a short section of gas pipe railing, stands directly in front of each time clock, though separated from it sufficiently to allow a person to pass between it and the clock. Until these rails, which are not over two feet long, were placed in their present positions, much trouble and annoyance was experienced owing to the fact that at closing time employees engaged in a scramble in front of the time clocks because of their eagerness to be among the first to stamp their cards. As a result of such disorder many wrong numbers were registered. It was recognized that the presence of a long rail, forming an approach to each time clock, would compel employees to get in line and register their numbers in orderly fashion. There were objections, however, to such rails for the reason that in some cases these would obstruct racks and benches, while in other instances free passage through aisles might be blocked. A simple guard serves as effectively as a longer rail to suggest to employees the idea of forming a line. L. I. J.

### AN ECONOMICAL USE OF CORK AND WOOD

IN the modern practise of insulating machinery so that as much vibration is eliminated as possible the most satisfactory combination is to make a base consisting of cork and timbers. The drawing here reproduced shows one use of these materials that is practical where a minimum of care and expense is desired. Here




NO MATERIAL WASTED HERE

A simple way of anchoring a machine to its foundation to prevent transmitting vibrations

the base of the machine is anchor-bolted to a wooden frame supplied with a layer of cork between the metal and the wood, the wood being fastened to the masonry foundation by a separate set of bolts.

The method of insulation employed depends upon local conditions and the degree of quietness desired. G. O.

## CONTENTS—SECTION IV

## TRANSPORTATION



*See also items in other sections:*

## SECTION IV

## TRANSPORTATION

### A CHUTE MADE OF SLATS

TO avoid heavy, solid construction, the National Casket Company uses a chute made of slats for delivering its product from one floor to another during the process of manufacture. The bed of each chute is concave so that the sliding product touches at its two ends only. This reduces friction. The chute curves up to the horizontal at the lower end sharply enough to act as a brake and stop the material by friction just as it reaches the delivery point.

The bed of the chute is made either of parallel wooden slats or parallel iron straps, all following the concave form of the chute. These give just sufficient friction to stop the load at the end of the chute.

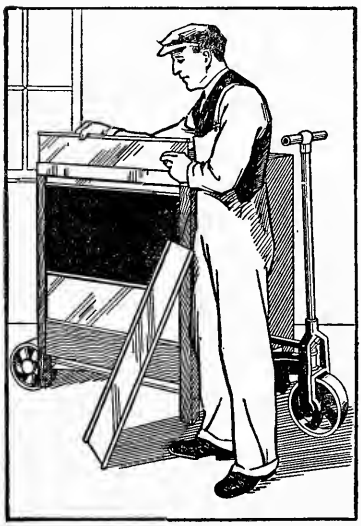
Pipe, supported at a height of three inches from the bed, forms a guard along the sides of the chute. This is sufficient to keep the material from dropping off the sides, and also offers a minimum of friction.

On the upper floor at the entrance to the chute is a trap-door, which is open only when material is to be sent down. A gong on the wall above the trap-door is rung as an advice to the workmen on the floor below that material is to be sent down. A push-button at the lower end closes the contact that rings a bell on the floor above as a signal that the men below are waiting at the foot of the chute ready to receive more material. R. I. F.

### USING A TRAILER "IN AND OUT"

"FOR hauling material from one building to another in our plant, we make use of an electric truck and a trailer," said one executive; "the freight elevator carries the trailer to the floor where a load is ready. Truckers push the trailer to the point where the material stands, load and return it to the elevator. When the trailer has been lowered to the ground, the motor truck hauls it to the elevator of the proper building and it is hoisted to the floor where the load is needed.

We eliminate carrying the load in small trucks to the elevator, unloading these trucks outside the building, and the reverse operations at the second building. G. N. A.



ADJUSTING A BIN TO THE LOAD
Rough parts and small castings carried in bulk are easily accessible in this steel skid-box with adjustable sides

### THIS SKID FITS DIFFERENT LOADS

ONE of the arguments advanced against the use of skids designed to be carried from place to place by some form of lift truck is that in many plants the uses to which the skids are put are so varied that the skids seldom fit the load.

This can be largely overcome by putting a little more thought into the design of the skid itself. Here in the picture, for example, is a skid designed for carrying large numbers of

small parts that must be easily accessible. Such a condition is fulfilled by making the skid so that its sides can be built up or cut down according to the load. At the same time it is easily accessible whether filled to capacity or carrying merely a small load. L. I. J.

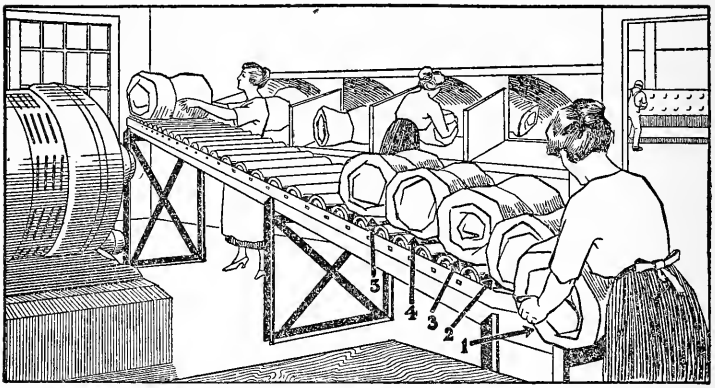
### GIVING FACTORY-AISLE TRAFFIC THE RIGHT OF WAY

IN the network of busy factory aisles traffic rules are coming to be as necessary as in congested city streets. Mirrors to help see around corners and warning horns on trucks are aimed to reduce the number of shop traffic accidents. But the right-of-way has always rested with the pedestrian. Perhaps this results in slowing up transportation—a condition that would not exist if different kinds of shop traffic were assigned to definite zones. A successful attempt at this is at the plant of the Westinghouse Electric and Manufacturing Company, where a post near one side of a passageway separates truck from pedestrian traffic. A. N. C.

### THERE'S NO SIDE-TRACKING THESE PARTS

THERE probably is no more common cause for factory mixups than work being side-tracked that should proceed along straight lines. This was the case with a manufacturer of overalls in Texas whose solution of the problem is applicable to nearly any factory.

In his own case material for different orders is bundled separately between certain operations. These bundles must be handled in sequence if no order is to be held up. That this sequence might be preserved he conceived the idea of making use of a section of gravity conveyor. The curious thing about this conveyor is that it is not put there to convey material at all, but simply to provide a means of placing the




PUTTING THE CONVEYOR TO OTHER USE

Short lengths of gravity conveyors like these make convenient holding racks for material "in process." Most important, they assure that each bundle is handled in its proper sequence

bundles of material in a row in the order in which they come. The operator who removes the goods is instructed always to take the bundle at the bottom of the conveyor. The other bundles then roll down ready for the next one to be removed.

The operators themselves see that the plan is carried out, and it is more satisfactory to them than any other method. In the case of hurry-up orders a red tag is attached to the bundle, and this is not placed on the conveyor section in sequence, but is placed on top of the lowest bundle of the series. This takes care of those few hurry-up emergencies that are bound to arise in any plant. S. A.

### TURNING TRUCKS INTO "ASSEMBLY ROOMS"

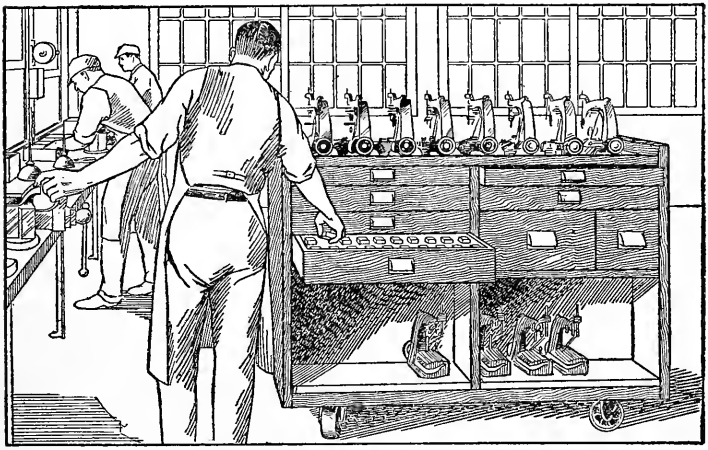
BY placing in operation an improved movable truck which carries from man to man all the parts required in assembling the machines, the Union Special Machine Company found the work greatly facilitated.

Formerly, parts were kept upon shelves and in boxes in a small accumulating room next to the assembly room. Obtaining them meant loss of time for the firm, loss of physical energy for the workman, and often an irritable frame of mind for both the foreman and his men.

Now the accumulating room is on another floor, where there is more room to arrange systematically the storage of the parts.

The trucks are filled at the accumulating room and wheeled from the elevator to the assembly room where the parts are used.

The final development of the plan up to the present time includes trucks built with slide-drawers opening on either side, each drawer designed and built to accommodate a number of like parts. One of the latest adaptations is shown in the illustration. Thus in the case of a machine requiring the attachment of 28 parts, 60 of each part are accommodated in each of



HE DOESN'T HUNT AROUND FOR PARTS

**Every piece that is to be used in assembling the sewing machines shown on top of this truck is carried in compartments of the small drawers**

28 drawers or compartments in the drawers. Sixty flat beds (the cast-iron base for the machine) are loaded on the top of the truck. The truck passes from man to man without a hitch till all 60 of the machines are completed from parts, all of which are drawn from the truck itself.

This method is right in line with the "progressive order," the value of which is so well recognized in most manufactures. N. C. F.

### "FANNING DOWN" THE SPEED

AFTER the installation of several conveyor systems in the Velie Motor Company's plant, it was found that one gravity belt conveyor was running too rapidly. The belt of this conveyor runs in a vertical plane and is equipped with hooks to carry the material that is to be lowered by the conveyor. A rather unusual device was used to slow up the descent of these loads. The shafts of the pulleys at the ends of the belt were extended and equipped with large air fans, made of thin sheet metal.

The air resistance to the movement of these two fans effectively slowed the conveyor down to the desired speed. The exact speed that was needed was obtained by changing the size of the fan blades. The whole braking arrangement is of simple and inexpensive construction, yet it is durable and does the work. C. H. A.

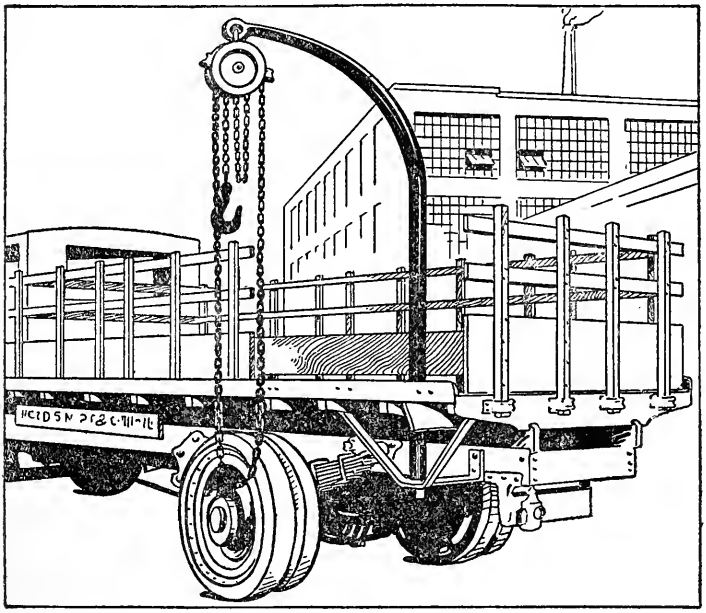
### PUTTING BINS ON PLATFORMS

IN one machine shop special platforms are provided for the elevating platform industrial trucks. Each platform contains parts for one destination. The different bins in the platform each carry different parts, the large lower section carrying the main castings or other heavy parts.

By constructing special platforms such as this, the service of the elevating platform industrial truck may be greatly increased. F. I. C.

### HOW ONE CRANE AIDS TRUCKING

A REVISED body or some special equipment installed on a motor truck is likely to pay for itself many times over in a short space of time.



A SWINGING CRANE IS HANDY

This swinging crane is built right into the truck body. With it heavy articles are hoisted up and over into the truck with one motion

As an example of this, take the swinging crane that ws attached firmly to the truck shown in the picture. Formerly, handling heavy materials in connection with this truck was a real job and the expense ran into money. The crane, however, equipped as it is

with a heavy differential block, not only saves a great deal of time, but is a preventive of accidents to the men and injury to materials. C. S. D.

### THE TEA WAGON'S FACTORY COUSIN

IT may be first cousin to a tea wagon, but the device pictured on this page serves a far more practical purpose than its socially inclined relative.

"In filling orders from our stock shelves," said an official of this plant, "three elements must be kept in mind—distance, speed and small muscular effort.

This "tea wagon in overalls" meets all three requirements. The intermediate cross-piece of piping, of which the entire wagon is made, serves as a ladder rung for reaching the upper shelves. As this rung is immediately above the fixed legs it adds to the stability of the "tea wagon" when used as a ladder. Thus, lighter wheels may be used than otherwise as the loads carried are not heavy.

THIS IS A "TEA WAGON IN OVERALLS"

Its use makes it much handier to fill orders from the stock shelves. The waste-basket carried along keeps the stock-room's aisles remarkably clean

By fastening lugs to the ends of the regular fiber tote-boxes these containers are securely held to the wagon. An inclined order board and spring clip are handily placed for checking off items of the orders as filled.

A waste-basket fastened to the wagon, aids materially in keeping aisles clean; frequently package lots are broken in filling orders and the container itself must be thrown away. Formerly the floor was the handiest waste-basket.

Nearly every factory has routine jobs like this—the importance of which well justifies a bit of concentrated thought in their handling. R. G. J.

### PUTTING WASTE SPACE TO WORK

WHEREVER an out-of-the-way room or corner can be used for a process which is not considered to be in the direct line of production, that much space is saved to the production department. This fact is particularly well illustrated in the plant of the American Thread Company.

Boxes of products which originate in one building are carried across into another building by means of a double-roller conveyor which runs through a bridge between these two buildings. After this conveyor had been installed, sufficient space remained to take care of an entire process—that of assembling fiber boxes used in the packing department. The housing of this operation in the bridge was made possible only through the construction of special tables designed to stand over the roller conveyors with the tops raised sufficiently high to permit the passage under them of the boxes carried on the conveyors. Since this is a gravity conveyor it was necessary to construct a number of smaller tables, each one of a different height.

All of these tables, with one exception, are used to store bundles of unassembled fiber boxes. The empty table is used to assemble these boxes. When ready for use, they are distributed to the various packing departments by means of the double-roller conveyors.

Where it is not possible in a manufacturing plant to utilize a previously vacant space for a new process it is frequently practical to shift equipment—this conveyor, for example—so that, it occupies no space that might better be used for something else. C. H. E.

### NO REHANDLING HERE

THE uses of various forms of lift trucks are so numerous that a day might be well spent by the factory executive in nothing but devising ways and means of utilizing such a truck in his plant. Typical of savings effected by putting a truck of this kind through its paces, so to speak, is the method that one company used in moving its large number of parts. Instead of transferring the parts into tote boxes and then again to another bench, the whole transfer is simplified greatly by slipping a lift truck underneath the first bench and drawing work, bench and any tools that may go with it over to the new designated location.

If the object to be moved—a bench, for example—is of extreme length, the legs on one end may be mounted permanently on small wheels. It is only necessary then to run the lift truck under the end that has no wheels and haul it away. S. T. E.

### GIVING MOTOR TRUCKS BETTER ATTENTION

IN view of the advantages to be gained through proper inspection and maintenance, which are found to a remarkable extent in the largest and best-equipped private garages, where fleets of trucks are cared for, and because of the difficulty of securing such care on the part of the owners of small numbers of trucks, several groups of Connecticut truck owners are getting together and establishing "community garages." Their object is to give such owners the advantage of

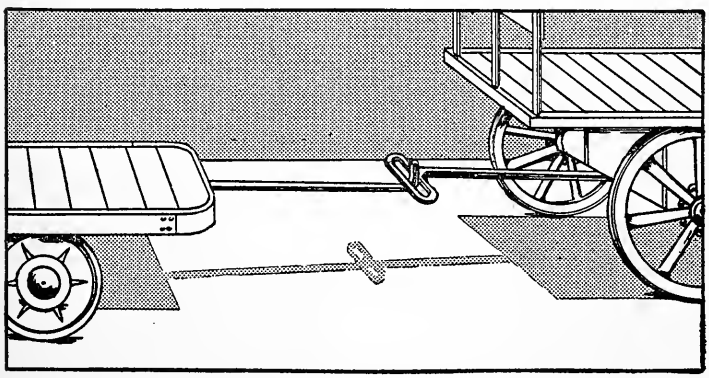
proper care with respect to the ordinary storage and cleaning of their vehicles; to supply gasoline or electric driving current; to provide inspection and maintenance of their machines, and to rent spare trucks of similar capacity when their own are being overhauled. This development, if properly organized and supervised, bids fair to solve for many truck owners one of the most difficult problems of the future. N. C. F.

### MAKING TRAILERS TRACK

A LARGE eastern railroad terminal employs numerous storage battery trucks with trailers for handling baggage. The problem of making these trailers follow the lead, without short-cutting at corners, is a serious one as it is in many factories with narrow aisles.

The railroad finds one of the simplest arrangements the most satisfactory—nothing more than a pin sliding in a link.

This is clearly shown in the sketch below. A fixed drawbar supporting on its end a heavy pin or



COULD ANYTHING BE SIMPLER?

If you have difficulty making trailers track, perhaps this plan for getting them to follow the leader can be used

dog extends from the power truck. Over this pin is dropped the link similar to the straight handle bar on the ordinary hand-drawn truck.

When the direction is straight ahead the pin remains in the center of the link. Now suppose the leading truck is turned to the left. That action is not immediately transmitted to the handle of the trailer. Not, in fact, until the turn is so far completed as to force the pin over to the extreme left side of its link and this takes time. Meanwhile the second truck has been going straight.

By adjusting the length of the link to the wheel bases, the following truck can be made to "track" perfectly.

This device is doubly practical because the link forms the ordinary hand grip when the second truck is used in the old-fashioned way. C. L. A.

### KEEPING TRACK OF SKID PLATFORMS

WITH six departments using elevating trucks and consequently numerous wooden platforms in connection with them it was only natural that an eastern paper goods concern would experience some trouble keeping a sufficient supply in each department. It was expected that each department would be supplied with a quantity that would enable the foreman to take care of his work and that these platforms would be for his use only. When they were used for sending material to other departments it was intended that they should be returned as soon as empty.

This method led to a lot of trouble, for some department usually needed more platforms than it had and seized on those available. To identify the platforms they had been numbered with large letters, but in many cases it was reported that these letters had been scratched off and others put in their place.

The number of bickerings between departments convinced the engineer that a better means of identification was necessary. He redistributed the platforms and painted runners or sides of the skids a distinctly different color for each department.

The color stands out prominently and a passerby need waste no time in learning where the platform belongs. Little trouble is experienced now in securing the return of empty platforms to the proper department. The workers have all been warned against using any but the platforms of their own department without written permission. N. O. L.

### THIS CONVEYOR BOXES THE PRODUCT, TOO

WHILE conveyors are usually considered simply as mechanical means for moving materials, sometimes they can be made to act as automatic machinery for assembling operations.

An example of this is pictured on page 117. Here the cans of oil to be boxed move down the straight conveyor shown on the right-hand side of the photograph while the box in which the cans are to be packed comes in on the curved conveyor discernable at the left. At the point where box and can come together, the operator simply presses a foot lever and the box tilts at such an angle that the can is easily pushed into it.

Upon releasing the lever the box with the oil can resumes its upright position on the conveyor and is automatically carried around the curve to the nailing machine which nails the cover on.

The boxes with covers on as they come from this machine pass directly along the gravity conveyor to the inclined belt conveyor seen in the background, and this transfers them direct to the steamships in which they are shipped to foreign ports. L. A.

## CONTENTS—SECTION V

## MATERIALS AND SUPPLIES

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## MATERIALS AND SUPPLIES

### HANDLING PIECE-WORK RECORDS

FORMS which are designed for the purpose of keeping records necessary in following a piece-work job through the shop must conform to the department organization and lend themselves to use in the control of factory output, the recording of labor and material, and the figuring of expense and estimates. It's an individual problem for each company to solve.

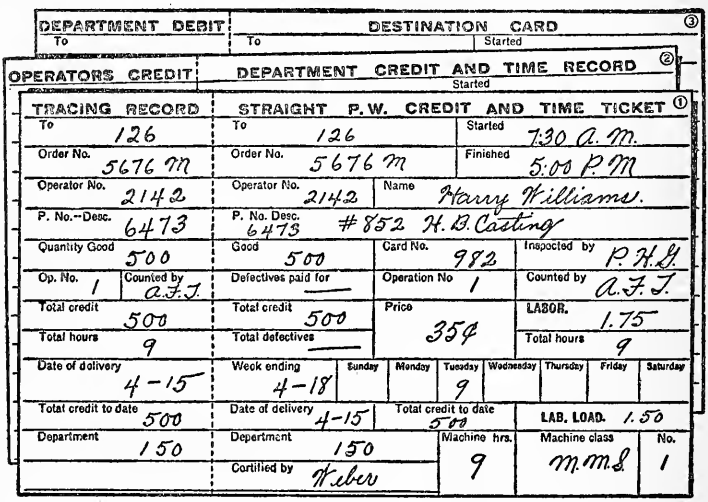
One corporation uses in five factories the three cards reproduced on the next page. These cards are similarly divided, but are printed in different colors. This simplifies selection, where they are found together.

Number 1 in the cut is self-explanatory. The portion on the left is torn off and serves to locate the order during the process of manufacture. In case the order is to be worked on in another department, a different tracing stub will replace the original one when the job is turned over to that department.

The payroll is made up from the credit ticket portion of number 1, when it is turned in to the cost department. These time and credit tickets are compared with the time cards punched "in and out" at the clock by the workmen.

This same method is followed for both the piece-work and day-work tickets. Since these credit and time tickets are the basis of payment to the workmen, the payroll checks exactly with the labor cost as distributed to orders.

Then the operator needs a record of the work that he has turned out. This need is filled by the "operator's credit" portion of number 2. The right-hand part of card number 2 is kept by the clerk of the department doing the work. This is filed with the department records.



DEPARTMENT DEBIT — To

DESTINATION CARD ③ — To — Started

OPERATORS CREDIT

DEPARTMENT CREDIT AND TIME RECORD ② — Started

TRACING RECORD

STRAIGHT P.W. CREDIT AND TIME TICKET ①

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| To 126 | | To 126 | | | Started 7:30 A.M. | | | |
| Order No. 5676 M | | Order No. 5676 M | | | Finished 5:00 P.M | | | |
| Operator No. 2142 | | Operator No. 2142 | | Name Harry Williams. | | | | |
| P. No.–Desc. 6473 | | P. No. Desc. 6473 | #852 H.D. Casting | | | | | |
| Quantity Good 500 | | Good 500 | | Card No. 982 | | Inspected by P.H.L. | | |
| Op. No. 1 | Counted by A.F.J. | Defectives paid for — | | Operation No 1 | | Counted by A.F.J. | | |
| Total credit 500 | | Total credit 500 | | Price 35¢ | | LABOR. 1.75 | | |
| Total hours 9 | | Total defectives — | | | | Total hours 9 | | |
| Date of delivery 4-15 | | Week ending 4-18 | Sunday | Monday | Tuesday 9 | Wednesday | Thursday | Friday | Saturday |
| Total credit to date 500 | | Date of delivery 4-15 | | Total credit to date 500 | | LAB. LOAD. 1.50 | | |
| Department 150 | | Department 150 | | | Machine hrs. 9 | Machine class M.M.L | | No. 1 |
| | | Certified by Weber | | | | | | |

THREE CARDS COMPLETE THE SHOP RECORDS

When an operation is performed on a job, this record is made out in triplicate to furnish records, on that operation, for the paymaster, the department, the stockroom, the office, the operator, the tracer, the trucker, and the next department

The "destination card"—number 3—serves to identify the order. This right-hand part of the card remains in the box with the goods.

The department receiving goods on this order keeps the smaller part—the left-hand side called "department debit" tag — for the completion of its records.

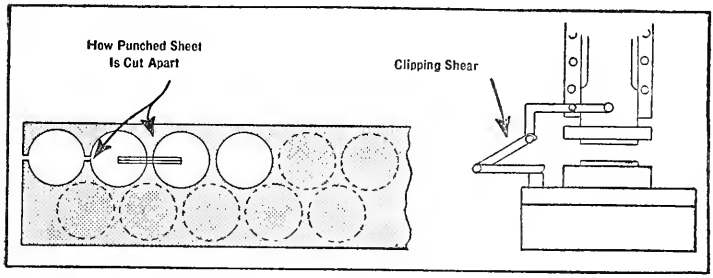
Though such records are similar in their general principle in different plants, one card may carry the information in a simpler or more accurate manner than another.

R. E. S.

### CUTTING SCRAP AS FAST AS MADE

IN blanking from sheets of considerable size, difficulty is always experienced in handling the scrap. The blanked sheet is usually so clumsy that much time and effort are lost in getting it under the arbor of the press.

A method of automatically clipping the sheet at its narrowest point simultaneously with the stroke of




MAKING SCRAP LESS BULKY

This shear attachment clips the small neck between the punched-out spaces, and enables the worker to handle the punched sheet much easier

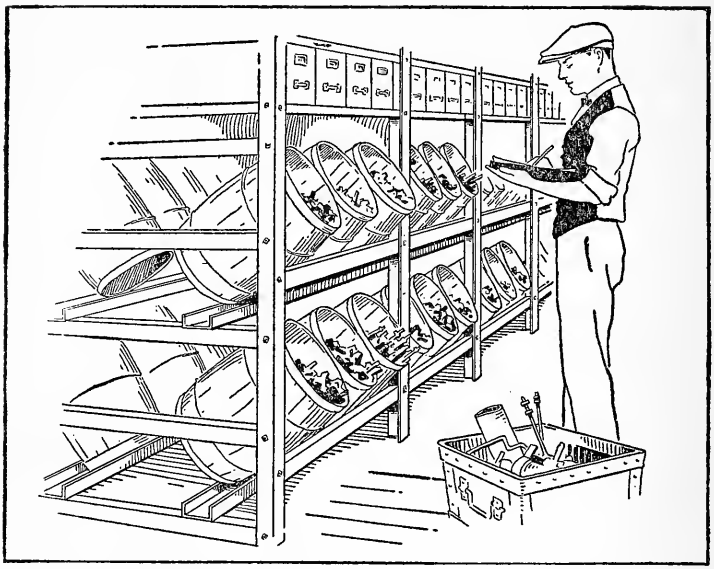
the press is illustrated in the sketch above. This leaves long narrow strips of sheet scrap, which can be readily thrown to one side. Their uniformity makes for continued ease in handling to the scrap press.

E. C. H.

### A CONVENIENT USE FOR CHANNEL IRONS

WE felt around in the bottom of kegs at arm's length of the hidden last few pieces, just as many a stockkeeper in many a plant does every day, until we devised this simple keg rack," said one stockkeeper, referring to the arrangement illustrated on the next page.

Now an ordinary channel iron with the hollow side up holds the kegs securely in place and of course



GIVING THE KEGS AN "ANGLE OF ACCESS"
Formerly these kegs, stored vertically, were hard to see into. Now the rack built of channels and light angle irons make them easy of access

provides adequate strength. Then the ordinary angle iron cross-pieces for holding the whole rack together are arranged at the proper heights to give the desired tilt to the kegs, as the illustration above clearly shows.

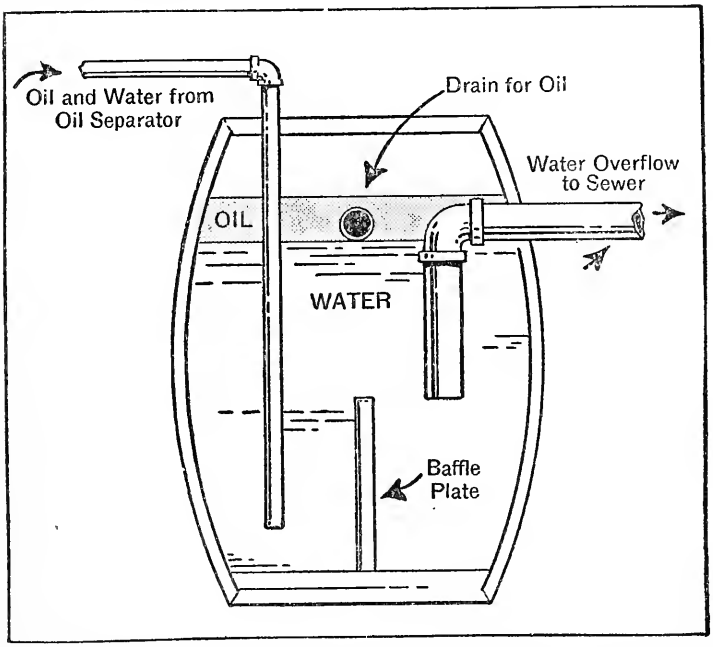
It's a simple application of ordinary steel forms, but it does the business. N. C. F.

## SAVING LUBRICATING OIL

OIL separators are found on the exhaust lines and the feed-water heater in practically every power plant of any size. Their purpose is to remove the cylinder oil from the exhaust steam, so that this steam may be condensed and re-used for boiler-feed purposes.

The oily discharge from the separators in most cases is drained through the waste lines out to the sewer.

One engineer, however, saw the opportunity for effecting a saving in lubricating oil by recovering the oil which has been removed from the steam. In order to do this, he ran the discharge from his oil separators into a barrel arranged, as shown in the sketch below, so that the oil would raise to the top while the water would be carried off.




HOW THE OIL IS SEPARATED

The discharge from oil separators is run into the barrel, and the oil rises to the top. It is then drained off and used around the plant on jobs not requiring a high-grade oil

This floating oil was skimmed off the top surface through a pipe and put through a small oil filter which removed a large part of the dirt and grit. This oil was then used for the more rugged service around the plant, such as on the coal-truck wheels, sliding-door

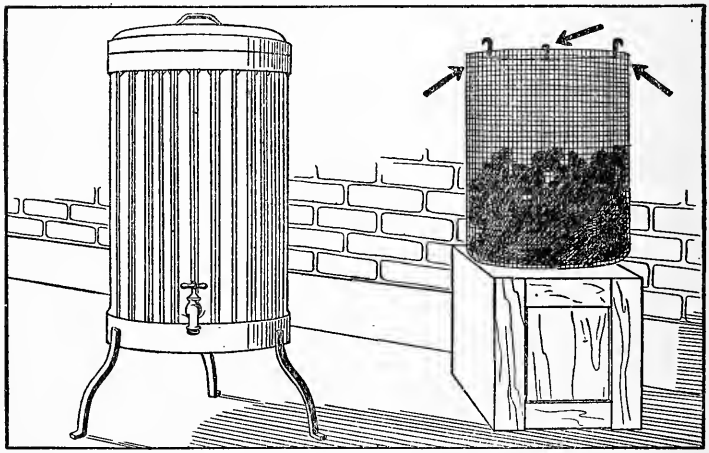
fixtures, and other crude bearings on which it previously had been the practise to use new oil.

With the present high prices of oils of all kinds such a simple scheme ought to be found useful in most plants. W. B. S.

### INSURING THOROUGHLY OIL-SOAKED WASTE

IN a shop where a quantity of oily waste is used, some trouble was encountered in treating it properly. To overcome this the superintendent took an ordinary garbage can, put it on three legs, and inserted a standard water faucet near the bottom. Then he made a wire basket to fit the can, now the waste to be oiled is placed in the wire basket shown in the picture below. The basket is then lowered to the bottom of the can and immersed in oil. The waste remains there until it is thoroughly soaked in the oil.

Then the basket is raised and fastened to the top of the can by means of three hooks attached to the



THIS WASTE IS THOROUGHLY OIL-SOAKED

After the waste is saturated, the basket hooks are hung over the sides of the can and the oil drippings are drawn off

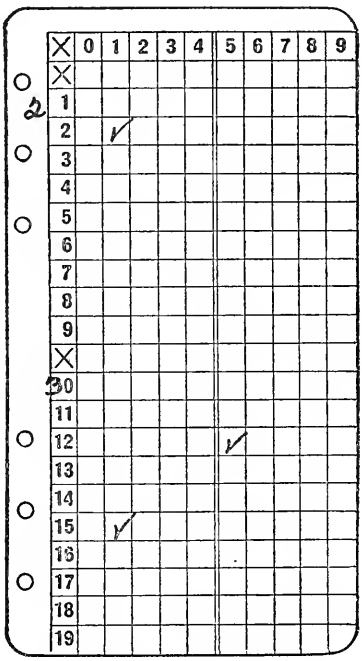
side of the basket so that it can drain. The surplus oil is squeezed out by means of a heavy club. In this way it is possible to get enough oil into the waste and also to effect quite a saving in oil. The oil not absorbed and that squeezed out of the waste is drawn from the can by means of the faucet and used over again. H. A. R.

## RECORDING NUMBERS BY MEANS OF A CHECK

IF a stock clerk is going over a lot of goods and setting down order numbers or sizes, it requires time and effort merely to record the numbers.

One shipyards superintendent has devised the loose-leafed pocket-notebook form reproduced on this page for this very purpose. He finds that it has wide application. Instead of writing down, for example, the numbers 21, 125, 151, three check marks are made as shown —a much simpler operation than writing it out, and more legible, particularly if done with a stub of a pencil by a man with gloves on and with numbed hands.

In case the numbers are of a higher order, digits are added in pencil at the left. Thus here the checks represent 221, 325, and 351, instead of 21,125, and 151. R. G. J.




IT'S EASIER THAN WRITING THEM OUT

A pencil check properly placed tells the story. Besides being quicker there is less chance for error from illegible figures

## HOLDING A GRIP ON REQUISITIONS

IN many concerns thousands of dollars monthly are spent through the storeroom. This stock is generally issued upon requisition to anyone holding a signed requisition. An enormous possibility of leaks is then created.

It may be understood in the storeroom that one man is privileged to draw stock, but anyone can forge this man's name. Too many persons being able to draw stock only causes a great supply of stock in process of use or in desks, as in the case of stationery. The privileged man when leaving the company can go to the stockroom after his dismissal and requisition stock to his liking.

To prevent any such contingencies arising, an eastern concern, desiring to standardize its requisitions, uses the form reproduced here.

**Requisition Authority**

Dept. 96 Date Effective 7/1/20

| Signature | Approved | "A" | "B" | "C" | "E" |
|---|---|---|---|---|---|
| John Doe | John | ✓ | | ✓ | |
| B.A. Taylor | A.H.T. | ✓ | ✓ | ✓ | ✓ |
| R. Jones | A.H.T. | ✓ | | | |

**Instruction**

Place a check (✓) opposite name under storeroom where signature is to be honored. Storerooms to issue stock only to those persons whose signatures appear on this list.

TO PREVENT PILFERING

One manufacturer distributes blueprints of this "signature list" to each stockroom to prevent unauthorized requisitions

The original consists of a form printed on tracing paper. Each department manager is supplied with one of these forms at periodic intervals. The signatures of those authorized to requisition stock are secured and a check is made under the initial of the storeroom from which the signer can secure stock. Upon the approval of the department manager the forms are sent to the blueprint room, where sufficient copies are made for each storeroom.

In this manner only those authorized can secure stock and only upon the proper signature. Any employee who has had requisition privilege upon leaving the company has his name automatically removed from the list; and this company saves thousands of dollars yearly. N. Y. T.

### WHAT EVERY BUYER OUGHT TO KNOW

THE case of the purchasing agent of one company in Indiana illustrates how important is a knowledge of his factory operations to the man who buys raw materials.

His specialty was the purchasing of fabric. He knew the market and he knew the technical qualities of good fabric for the different purposes for which the company used it.

But the purchasing agent knew nothing about the operations themselves. He did not know whether a department would be better served, whether work would be eliminated and men saved if he bought all of the particular fabric in 300- or 400-yard lengths. He had been buying from jobbers here and there, 50-yard rolls, 100-yard rolls, 600-yard bales, and so forth. He saw and knew only the market end of his business.

Then, one day, a wide-awake young fellow got a bird's-eye view of the whole thing. After studying the proposition from the standpoint of waste, and facility in handling, he standardized the length of fabric to be used. This was something the company or purchasing agent had never heard of before.

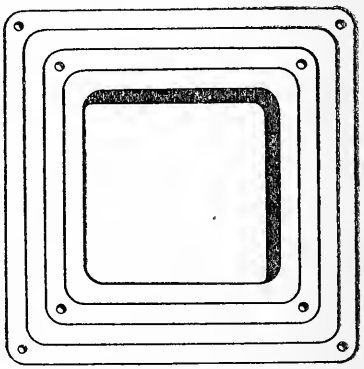
This little standardization cost the company approximately $1,000 more a year on all their fabric, but by the elimination of the extra handling in certain departments the time of six men was saved. At a minimum of $6 a day per man, this amounted to $10,000 a year.

There was also an increased use of the equipment and increased production owing to the fewer number of changes and set-ups. All in all, the cut in costs was surprisingly large. This Indiana company now makes it the business of the purchasing agent to know shop practises and operations. The purchasing agent and the production manager have their offices beside each other. W. N. J.

### TURNING "ECONOMY" INTO "PROFIT"

A SAVING typical of what can be done toward waste prevention in punch-press work is illustrated by the manner in which one manufacturer of pressed-steel medicine cabinets makes a small cabinet, much of the material for which is waste from the larger cabinets.

All of these cabinets contain mirrors. In punching the frames for the mirrors, which also form the door frames of the cabinets, a rectangular piece of metal is always left over.



A SAVING THAT MAKES A PROFIT

After the cabinet-mirror frame is punched out, a frame for a smaller cabinet is punched from the metal left

It is logical to make a line of smaller cabinets by punching from the left-over pieces of the larger cabinets frames similar but smaller in size. This kind of saving is so profitable that it frequently pays a manufacturer to spend considerable time thinking out new products to put on the market which can be made out of the left-over pieces from his standard output. C. H. M.

### TAGS THAT DON'T TEAR OFF

MUCH inconvenience comes from tags, tied to packages, being torn off in transit. This is a hindrance to the accurate moving of material. To avoid losses of this sort one large company makes use of a tag with four holes in it instead of one.

Instead of one corner of this tag being tied to the package, thereby leaving it free to flap around and become torn, a manila tag is tied around the package.

This makes it lie flat on the package, and prevents any possibility of its coming loose and flapping about to tear off. Although this was used on an automobile tire, the same method can be used in tagging nearly any kind of package, and the slight additional expense of providing a tag with four holes instead of one, will usually be well repaid in losses thus avoided.

E. R. S.

### KEEPING ROUTING CARDS CLEAN

WHEN routing cards, sent along with an order of material, encounter oil or dirt, they often become so soiled that they are not legible. To overcome this difficulty the Greenfield Tap and Die Corporation shops enclose the card in one of their regular mailing envelops that have wax-paper windows. Their routing card is so arranged that the figures and information most frequently needed during the journey through the shop come under the window in the envelop.

If further information is needed for accurate processes and so on, the card is easily removed from the envelop. It is left unsealed for this purpose. The outside of the envelop furnishes sufficient space for any notations that have no proper place on the routing card. Through long usage, this plan has proved the practicability of these envelops for the route cards. P. F. O.

## CONTENTS –SECTION VI

## MATERIAL SAVERS

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## MATERIAL SAVERS

### SAVING PACKING LUMBER

THE Jones and Lamson Machine Company used to enclose their machines in a complete box of heavy lumber, even for domestic shipment. Recently, however, they decided to try a skeleton packing. This was found to result in no greater injury to the goods, and it saved a great deal of lumber.

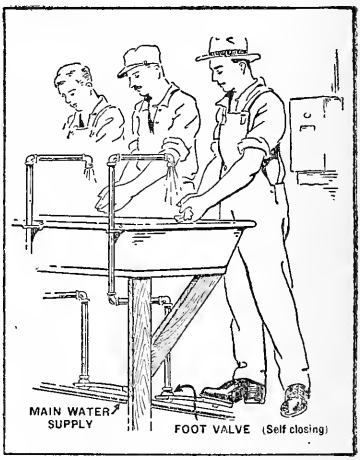
The practise now is to build a platform beneath the machine with cross trucks sufficient for smooth riding on rollers and then to build a skeleton frame of four posts up the four corners of the machine and four cross pieces, sufficient to hold the platform snug to the machine. The bulky parts of the machine are enclosed in a special housing built to fit that part of the machine and fastened to the main frame. But not all the parts formerly thought bulky really need the precaution of close boxing. Lever handles, for instance, may project a little from the machine, and so apparently be liable to injury. They are not, however, delicate and would stand considerable strain. Even if they were scratched this is not the same as denting the tooth of a gear or some other essential interior part, for a lever is as strong with a scratch on it.

While it should always be the practise of a manufacturer to pack his product so it will arrive in perfect condition, investigation frequently shows that valuable packing material is wasted through needless precautions. E. R. A.

### ONE LITTLE HELP FOR THE COAL PILE

ONE of the savings made possible when the management of a large plant investigated heat waste, involved the hot water faucets in general use throughout the works.

A study was made of the use of hot water in all departments. Where it was used only for convenience and was not a necessary part of process work the hot water was shut off. The use of hot water in the lavatories was discontinued not only in the main offices but in the manufacturing departments as well. It was found that in passing through the piping the temperature of the water was raised sufficiently so that it could be used for strictly cleansing purposes.




STOPPING THE WASTE OF HOT WATER

Workmen are liable to forget to turn off hot water after washing. Here foot-operated valves shut it off automatically as soon as the worker removes his foot

In many of the departments when it was found necessary to retain hot water, self-closing faucets were installed. The total number of hot water faucets throughout the plant was decreased 30% by this close scrutiny of real needs.

The illustration shows how waste was eliminated even at those taps still retained. The mechanism consists of a self-closing valve operated by the workman's foot. In this way, only the amount absolutely necessary was drawn. There was no chance of the excess being allowed to run to waste. By operating

the self-closing valve by foot, both the workman's hands are left free to wash with, thereby permitting the operation to take place in the shortest possible time. This is a pretty good plan to keep in mind in looking over your own plant since the cost of coal plays such an important part in the manufacturing process. H. G. S.

### SAVING OIL AFTER TEST RUNS

IN a 36-inch planer which is made by a New England company there are eight oil wells, each holding a pint. In the 54-inch planer made by this same company there are 10, each holding about two quarts.

By the use of a squirt gun it is an extremely simple matter to remove the oil before the ways are slushed for shipping. This oil is used again in the saws and threading machine.

If the persons receiving the planer do not remove the oil before using there is a great chance of damage to the ways and V's by steel chips, dirt, and foreign substances which accumulate in shipping and settle in the oil.

By removing the oil before shipping it can be re-used as stated above. Thus there is a twofold advantage in doing this—a worth-while saving in oil and also a lessening of liability of damage to the planer. J. L. H.

### CUTTING COSTS ON PAPER TOWELS

PAPER towels are just one of the incidental items, the cost of which worried our office manager until he worked up a little poster which has effectively operated to decrease the waste in this one supply. He worked on the old theory that the average individual realizing the cost of an acticle will not be so likely to use it carelessly or to waste it as if he were totally ignorant of its value.

At each point where paper towels are available, he posts a little sign which reads, "Last month we paid out 000000 dollars for towels used in this company. Each individual can help reduce such amounts."

This plan has worked out so well that the managers are considering the advisability of applying it to all the miscellaneous supplies used in the office, and even of expanding upon the form of the chart itself. The new form considered is a graph which would indicate the cost of an item used each month. For example, in a neat little glass frame below the container for the towels would appear a chart with a curve drawn upon it indicating the variation in the cost of the towels used each month. One important element which must not be overlooked is to make the figures exact so that no one in the office may have any basis for a claim of propaganda. T. F. M.

### GLASS PLATES SAVE TABLES

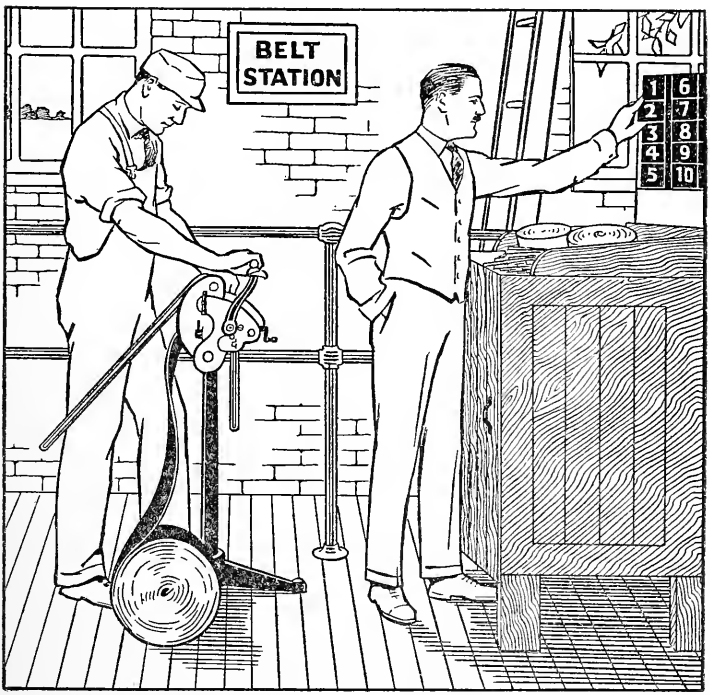
A FOREMAN in a plant which makes tooth brushes was troubled with having to renew frequently the top board of the tables at which the operatives worked on the handles. This work involved wiping each handle with a sponge damp enough to take off any dust.

When the sponge was dropped carelessly upon the table top between operations on successive brushes, it softened the hardwood surface, which became pitted and easily silvered. But the top of the table had to be smooth and even to properly handle the brushes in groups with speed and dispatch without getting slivers into the brushes, so new table tops were frequently put on. The expense of tearing apart a table and renewing a two-inch hardwood top was considerable. So a small rectangular plate of white glass, the material used in lunchroom table tops, was tried with success.

The small plates of white glass in place cost 55 cents apiece. Even if they do break or get worn, only the small plate, and not the whole table top has to be replaced, and it can be done quickly. J. Y. M.

### REPAIRING BELTS PROMPTLY

ALTHOUGH electric drives and direct-connected machinery are coming more and more into use, nevertheless, there are thousands of belt-driven machines in operation today; and there will be for years to come.




"FIRST AID" FOR INJURED BELTS

One of these stations is located in each department at the Westinghouse plant. Belt troubles are thus taken care of almost as soon as they occur

One of the arguments against belt-driven machinery has always been the loss incurred by breakage of the driving belt. While this, of course, is a real objection, no doubt will always be a source of loss and trouble, nevertheless there are ways of lessening the loss. For example, in a central location and prominently marked with signs in each department at the Westinghouse plant are located what are called belt stations. Machines having belt troubles are promptly indicated by number on the signal rack so that a minimum of time is lost by the belt repair man in giving relief. With all modern facilities at hand for repairing belts and with a man or men whose sole job consists in making repairs as nearly instantly as possible, a minimum of time is lost in which the machines are down from belt trouble. No doubt any plant using belt drives to considerable extent would profit greatly by providing some sort of belt-repair station and means of notifying this station as soon as a machine is out of commission due to belt trouble. N. C. F.

### KEEPING EYES OPEN FOR SAVINGS

LOCATING a convenient "source of supply" very often solves the problem of high costs, which seem to be irreducible due to the closeness of figures submitted by a number of vendors, from whom prices were solicited. To illustrate:

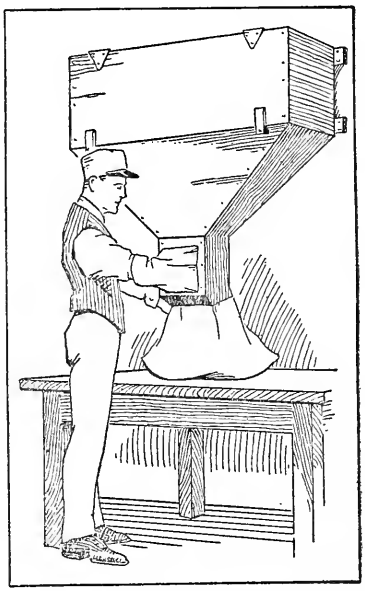
A concern paid a local dealer 90 cents each in quantities for wooden boxes 30 by 20 by 11, and as other box concerns could not touch this price it was taken for granted that nothing could be done to bring about a reduction. It happened, however, that a nearby plant was receiving supplies in wooden boxes the dimensions of which corresponded to the sizes mentioned, and as this particular plant did not re-use the boxes, they readily agreed to sell them for 25 cents each.

The buyer of the concern interested in the boxes put the finishing touches to the transaction mentioned, but credit for the suggestion was duly accorded to one of the automobile drivers. It was he who saw the boxes, and it was his foresight that started the ball rolling. Such is the spirit of cooperation. T. J. C.

### PREVENTING WASTE OF DOWN

IN an upholstering factory many of the better grade cushions were filled with fine down. The down was put in a large box, the workman crawled half way into the box and then stuffed the down into the cover. When the cushion was filled, usually there was about as much material scattered around the room as he had placed inside the pillow. The down was light in weight, and also expensive, which made this operation costly in time and material.

As an improvement, a self-feeding chute was planned. The bag of down now is placed mouth downward in this. At the bottom a sleeve is placed on one side, as shown in the illustration. Into this sleeve the man inserts his arm. Similarly, back of this and resting on the table the cushion cover is pulled tightly over a projected opening.



THIS SLEEVE SAVED MATERIAL

When cushions were filled with fine down, much of it spilled on the floor. This sleeved arrangement prevented nearly all the waste

The man works without any dust getting into his face and there is absolutely no way in which the material can get loose around the room. The saving of material during one day's work more than offsets the cost of the special chute and table underneath it. L. J. C.

### A LITTLE HELP THAT SAVED MONEY

A TORONTO manufacturer of an automobile accessory which is made up of many small parts found that his workmen were spending much time in picking up little parts which were almost continually finding their way to the floor. To save time and to secure better value from his labor, this maker installed new work tables with the edges raised slightly.

When an employee now drops a small screw or part, the piece rolls from the edge of the table toward the center and is easily recovered. The new equipment was secured to make up for a reduced working staff larely composed of help that was more inexperienced than in former years. W. M. G.

### INSURING THE FACTORY LUMBER SUPPLY

ONE manufacturing plant used a considerable quantity of lumber in connection with its shipping and packing department, and because of the restricted space available for lumber storage, it frequently became necessary to hustle around town to pick up lumber to meet their requirements, and incidentally often pay fancy prices for it. There was also the inconvenience caused by this continual buying of material from week to week.

The purchasing agent finally hit upon the scheme of calling in a local lumber merchant from whom most of the purchases were made, and making an agreement with him whereby the company would purchase all their lumber through him at fair market prices, and in

return the lumber dealer would store for them in his yard, any excess supply which the company might buy from him from time to time. On this basis the purchasing agent could buy in carload lots at such time as the market was favorable, or when such lots could be bought up advantageously. The lumber dealer, also being assured of a steady outlet for a certain grade of material, could also take steps to stock up on these grades without undue risk, so that here again the purchasing agent insured a steady supply of lumber. A. L. M.

### TAKING ONLY THE SIZE HE NEEDS

WHEN emery cloth or other abrasive cloth comes to the workman in full-sized sheets, he is likely to use more than he needs. A sheet will be torn to get the particular size of piece needed and very likely the remainder wasted.

To overcome this source of waste, some companies use abrasive cloth in long strips of various widths from ¼ of an inch to 2½ inches put up on spools. Under this plan an operator is not disposed to clip off more than he needs and throw the remainder on the floor to be lost. W. B. T.

### KEEPING TURNINGS ON THE MOVE

EVERY concern that goes deeply into the question of saving waste materials has its own methods for handling this scrap.

Some of these methods can be applied only to certain concerns, but the method that one plant uses is applicable to any number of factories.

The waste material or scrap that comes from the various machines in this plant is all turnings and is bulky in form. It is taken out from underneath the machines at night so that during the daytime the

salvage department can get at it and send it to the proper places. The employees in the salvage department take this material and put it in buckets and conveyors.

After the buckets are completely filled, the men send them to one department where they are emptied and the material filtered into oil separators. After the oil is extracted, the scrap goes to the chip separators. From here it goes through the washing machines and on into the inspection department.

So that the salvage department will know each day how much scrap is handled, every machine is numbered and has a tag showing how much waste material it carries during the day. Then when the scrap is finally loaded into box cars and shipped on to be sold, the superintendent knows exactly how much material he sold and how much was handled during a definite period.

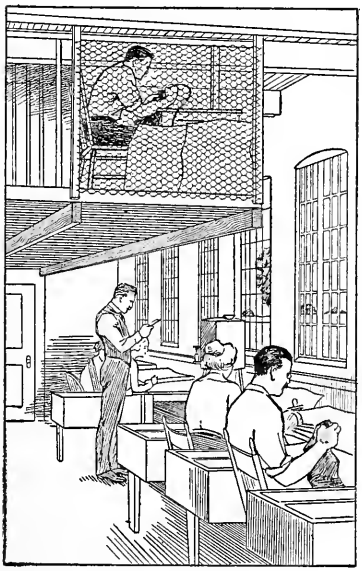
The real effectiveness of this plan lies in the fact that the scrap is cleared out every night so that the salvage department can get at it the first thing in the morning.

It takes a little time to do this, but it is worth while in the end because the men can get at it handily and there is no necessity for stopping the work of the employees to get at some of the shavings and turnings that lie around each machine. F. D. S.

### A MEZZANINE KEEPS WORK CLEAN

AN exceptionally dirty job sometimes has to be done in a room which must be kept particularly clean. This is true of the retouching room of the Florence Manufacturing Company, whose product has to be handled through the enameling or lacquering bath in quantities. Afterward the product must be looked over piece by piece.

Those few pieces which come out of the lacquering bath with a few small flaws, due to air-bubbles, are retouched by experts with a brush. Once in a while, however, it is necessary to give a piece of product a thorough treatment with an air-brush or spray. The tiny dots of spray must not be allowed to fly over upon the work at a neighboring bench. Yet the tools for the work, and the material, are here in this room, and the factory is not so arranged that another room could easily be provided at this point.



A SPECIAL LOCATION FOR A SPECIAL JOB

In this mezzanine cage suspended from the ceiling, workers put finishing touches on enameled pieces. It's out of the way, but there are other advantages which are explained elsewhere on this page

So the two problems of space and cleanliness were solved at the same time by building a cage which is suspended from the ceiling—a mezzanine, where this work can be done. It is above the tops of the racks and trucks, which need go no higher than a man can easily reach. So it really does not take up any extra space. When an operator has a particularly dirty job to do, he takes it to the cage. The sides of the cage are made of chicken-wire tacked to the suspending framework. If the operator feels that there is any danger of the spray flying to the work below, he lays heavy sheets of paper against the wire netting and clips it into place, thus having a paint-proof wall. P. F. O'S.

### HOW A PERFORATED BENCH SAVED

"WE make automobile tires," said one factory executive. "Our rubber stocks after being taken from the mill are laid upon a table to cool and at that time are dusted with soapstone.

"Formerly much of this soapstone found its way to the floor and could not be used again.

"But we have a suggestion system in the plant and not long ago someone suggested that a tray be placed underneath perforated tables. Now the surplus soapstone falls through the perforated table into the trays and is used again." R. B. L.

### STORING OIL IN CONCRETE

THREE concrete tanks, at the Trafford City foundry of the Westinghouse Electric and Manufacturing Company, have proved satisfactory as fuel-oil containers. Recently, one of the tanks was used to store transformer oil, and held the light flash oil as easily as the heavy fuel oil.

Each of the tanks has a diameter of 37 feet with a capacity of 125,000 gallons. Built of reinforced concrete, the tanks have successfully resisted the weather. The little seepage that occurred was easily stopped by the use of a concrete hardener on the tank. A. L. B.

### SALVAGING THE LEFT-OVERS

IN every factory there are a great many concealed nooks and corners where waste material of all kinds is apt to be thrown. Apparently the odds and ends that are thrown here are useless, but oftentimes, in a clean-up campaign, they are picked up and either used over again or sold at a profit.

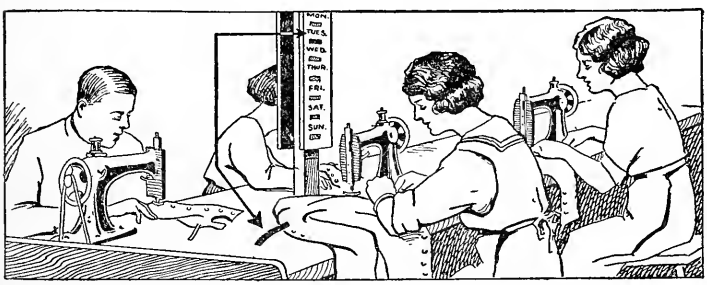
The Dayton Metal Products Company believes in using every bit of material that accumulates around

the factory. Some time ago it started a general clean-up. One of the results of this clean-up was the gathering up of all the odds and ends found in out-of-the-way and inconspicuous places around the plant and while they were apparently useless when they were discarded they were profitably put to work after they were picked up. They did not represent a great amount of money, but they showed the workmen how such odds and ends can still be used at a profit even though they appear to be worthless.

Such clean-up campaigns will show every factory superintendent how he can save more money. He will see that there is a lot of unnecessary waste throughout his plant and can take the opportunity to caution the workmen not to throw anything in the rubbish pile until he is first absolutely certain that it cannot be used any more. M. F. M.

## THE COLOR TELLS THE STORY

SPECIFYING shipping dates and adhering to them are two different things. They are made more nearly coincident, however, by a plan of color-labeling in use in the plant of Ed. V. Price and Company.



"THESE MUST BE FINISHED BY THURSDAY"

Nobody says this to the worker, but she knows it because there is a little strip of colored gingham pinned on each garment that goes through the factory. The color of the strip shows the worker on what day the garment must be ready to ship

When an order is received, the material necessary to fill it is laid out and cut. As each garment is cut from the cloth, a small strip of colored gingham is pinned to it. Each day of the week is represented by a different color. Then whenever an operator picks up the goods or parts of a garment, she knows immediately the exact day that this particular garment must be finished.

With this method in use, the matter of adhering to specified shipping dates is greatly simplified. Everyone knows the time when work must be finished and out of the factory and all work to meet that goal.

R. G. G.

### CHECKING SCREW OUTPUT

COUNTING and keeping record of production was always a problem in the screw machine department of the Line Materials Company. It was a simple matter to count the finished pieces by hand or on a counting scale, but the management was always ignorant of the quantity of waste produced by its operators. Furthermore, there was always a tendency to overrun or underrun an order.

"One of our men suggested the use of counting machines on the screw machines," said an official of this company. "The question then came up as to how to prevent a false count by the counter recording when the machines were running idle.

"We purchased a few counters to experiment with and were able to overcome this trouble by attaching them in such a way that the product itself tripped the counter lever. This entirely eliminated a false count when the material was used up.

"This application worked out very well, so satisfactorily, in fact, that we have since equipped all our automatics with them. This simple installation gives

an accurate count of total production and entirely eliminates overruns and underruns. It also gives certain knowledge relative to the most efficient operators and workmen, which we heretofore could not attempt to estimate. The use of this simple, inexpensive method of keeping track of production has benefited us to such an extent that we take great pleasure in passing it on to those who can use it as advantageously as we have." C. W. F.

### THERE IS NO VIBRATION HERE

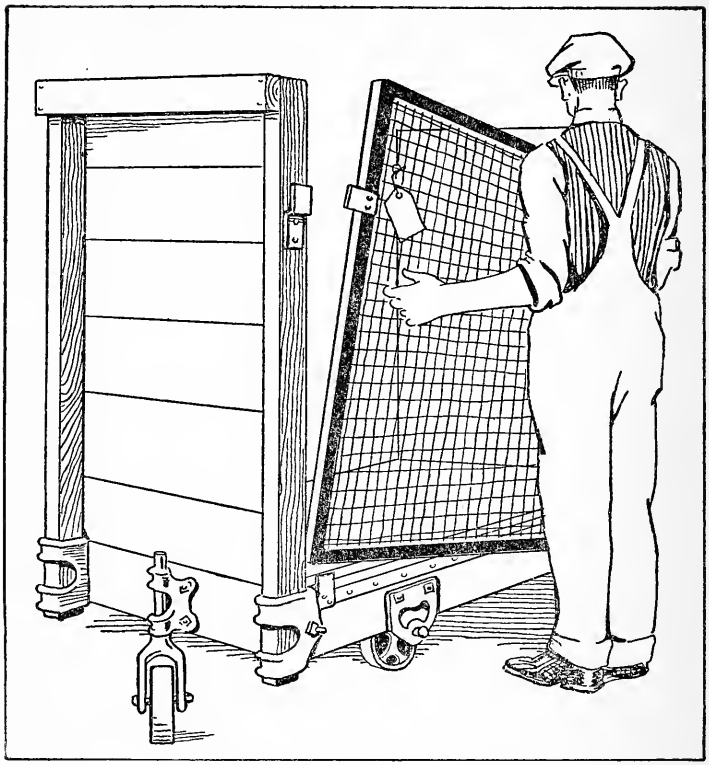
A PLANT manufacturing a great variety of small metal parts found that the best way of cleaning these was to rattle them or tumble them in water. When the tumbling barrels were put into the department with other machines the noise and vibration was too great and the water leaking out of the barrels kept the floor in bad condition.

After careful consideration the problem was finally solved by taking an old basement and fixing it up with drains for each set of tumblers. Water is piped to the barrels and to the rattlers. The leakage and dirty water emptied out is taken care of by these drains. Since the rattlers or tumbling barrels are geared to transmission racks bolted rigidly to the floor, there is practically no vibration whatever felt in the rest of the plant. A plan of this nature is readily adaptable to plants maintaining their own foundries.

A. M. M.

### WIRE-MESH SIDES FOR HAND TRUCKS

WHEN small departmental trucks are loaded into automobile trucks for transfer to other parts of the plant or when they are subject to considerable shaking from any cause, it has proved effective, in order to prevent loads from falling off, to close the



SCREENS THAT SPEED UP TRUCKING

Hand trucks that have to be moved on motor trucks are due for a considerable shaking. In order to prevent the contents from falling off, these wire-screen sides are used to advantage

four sides of each hand truck. One good plan is that followed by a manufacturer who added to all such hand trucks removable sides of wire mesh; the mesh being thoroughly bound in a rectangular iron frame. To the ends of the frame he fixed simple hardware catches which fit over similar catches on the end boards of the trucks. When the truck is loaded it is only a moment's work to snap the wire-mesh sides into place.

When a load arrives at its destination each small truck is wheeled off the automobile truck onto an elevator and sent up to the right department where it is wheeled to the proper machine. The truck can be unloaded from either side or both.

Not the least of the advantages of this open-work siding is the fact that the contents of the hand trucks are easily visible and the trucks therefore never are sent to the wrong departments, which happened frequently before. W. B. S.

### STATIONING A SHIPPING CLERK IN THE OFFICE

WHO decides whether an order that has one item out of stock shall be held for the missing item, or shall be shipped at once, and when the missing item shall be sent after it is ready? One factory has at the stock ledger desks in the office a clerk with years of practical experience in the shipping and packing room. He knows what each article looks like when packed, what a list of items will weigh, what space they will take up, and the shipping rates.

Whether or not it would be as economical to ship a part of the order, and if so, what part, is decided by him in the office before any material is picked out. This saves a good many freight bills for customers, and gets business. Making the decision in the office before any of the material is picked out saves moving material part of the way toward the door of the shipping room before someone discovers that it is not ready to ship, and then having it lie in the way there, half packed.

J. H. W.

## CONTENTS—SECTION VII

## BUILDING UP AND TRAINING THE FORCE



*See also items in other sections:*

## SECTION VII

## BUILDING UP AND TRAINING THE FORCE

### WHEN THE WORKMEN QUIT

THE cost to a firm when one of its employees leaves is made up of two parts. First, there may be an actual lapse of time in which the man's place remains unfilled. Second, when the new workman arrives it is at considerable expense that he is introduced to his new duties.

One company has its employment department interview everyone leaving its employ, whether discharged or not. If it is a case of discharge the man is referred to an adjustment committee to review the justice of the case. The statistics which accumulate are used by the management to get at the real seat of the trouble and discontent. F. I. C.

### REDUCING LABOR TURNOVER

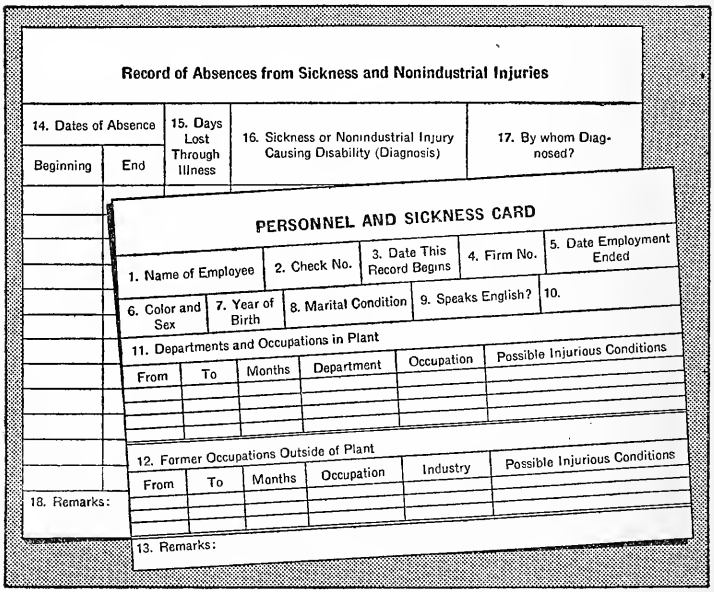
PERIODICALLY, there comes into manufacturing conditions throughout the country periods when labor is hard to get and when labor turnover, due to the men themselves shifting around, is a serious item to be reckoned with.

One manager finds that the proper place from which to draw workers is, as a rule, the immediate vicinity of the plant. So he is having made an industrial census of the community within a radius of one mile from his plant. He also is advertising the desirability of working within walking distance of one's home.

This preliminary work, while not so important at all times, nevertheless, is based upon a sound, common-sense policy, likely to make prospective employees see the advantages he points out. There is no doubt that his average labor turnover benefits. C. H. E.

## KEEPING TRACK OF SICKNESS

IN order to promote the adoption of a standard method of reporting sickness, the Public Health Service has worked out a plan which is presented in the Monthly Labor Review. A separate personnel card is kept for each employee in the plant, whether the individual becomes sick or not. The 4-by-6-inch forms are illustrated below.



Record of Absences from Sickness and Nonindustrial Injuries

| 14. Dates of Absence | | 15. Days Lost Through Illness | 16. Sickness or Nonindustrial Injury Causing Disability (Diagnosis) | 17. By whom Diagnosed? |
|---|---|---|---|---|
| Beginning | End | | | |
| | | | | |

PERSONNEL AND SICKNESS CARD

| 1. Name of Employee | 2. Check No. | 3. Date This Record Begins | 4. Firm No. | 5. Date Employment Ended |
|---|---|---|---|---|
| | | | | |

| 6. Color and Sex | 7. Year of Birth | 8. Marital Condition | 9. Speaks English? | 10. |
|---|---|---|---|---|
| | | | | |

11. Departments and Occupations in Plant

| From | To | Months | Department | Occupation | Possible Injurious Conditions |
|---|---|---|---|---|---|
| | | | | | |

12. Former Occupations Outside of Plant

| From | To | Months | Occupation | Industry | Possible Injurious Conditions |
|---|---|---|---|---|---|
| | | | | | |

18. Remarks:

13. Remarks:

HEALTH RECORDS THAT ARE VALUABLE

By keeping a separate personnel card for each worker, similar to those shown above, valuable health records can be quickly and accurately compiled. Health advice based on actual figures carries added weight with workers

From these personnel cards monthly tabular statements can be made, showing the number of cases of sickness occurring in the plant and the sickness rate per 1,000 persons. Tabs or signals on different divisions at the top of the card can be used to designate sex, color, and age groups. Thus, a blue signal at the top of the left third of the card indicates "white, male, under 25 years," and in the right third "45 years and over." A red signal can be used for white females, and so on. At the end of the month the number of workers of each sex, color, and age group in any occupation or department, or for the plant can be recorded quickly from these tabs. A distinct signal for each illness, attached to the card when the person becomes ill and removed at the end of the month, facilitates the keeping of the sickness record. B. E. H.

### WHAT IS A SUGGESTION?

THIS is a question that many workers ask themselves. Why not solve it for them by posting some such notice as this on your bulletin board:

"A suggestion, such as our committe is looking for, is a statement of an idea, method, plan, device, policy, or anything else which will contribute to the success of the company, and that includes the welfare of every employee of the company.

"A suggestion must be positive, not negative. That is, it should state a way for improving an unsatisfactory condition, not being content to state the difficulty only.

"A suggestion need not refer to your own work exclusively. Preferably, it should refer to something out of the line of your own work. You are always expected to make suggestions touching your own particular duties and for these you are paid a salary or wages. So if your suggestion does concern your own

task, it should concern the tasks of others also to be acceptable for a bonus.

"Suggestions which refer to a routine already ordered but for some reason not observed cannot be considered.

"Suggestions for plans already in preparation, though not yet in effect, cannot be accepted, but full proof will be submitted to you."

This plan was used by one concern and it gives the employees a better idea of just what is acceptable.

T. S. R.

### WASHING UP "ON THEIR OWN TIME"

IN one plant in Massachusetts, employees formerly registered on the time clock when they entered the building, and then proceeded to the wash and locker room where they changed clothing before going to work.

In the evening, the employees would also wash and change clothing on company time.

The works manager believed that because of this practise, a considerable increase in the manufacturing cost per unit resulted.

After studying the situation, he recommended that a small addition to the plant be erected just outside of the employees' entrance, and that the wash and locker rooms be placed in this addition, with the time clock between this addition and the main building. The suggestion was carried out and employees now do their washing up and changing of clothing on their own time, not stamping their cards until they are all ready to go to work.

The resultant savings, says the works manager, has paid for the cost of the building addition in less than a year and has shown greater production benefits than he had at first anticipated.

S. J. E.

### MORE SPACE TO "OLD TIMERS"

ONE concern has found so much interest displayed by its employees in those workers who have been in the plant for several years that, in its shop paper, it has added a department known as "The Old Timers' Corner," in addition to its regular personal paragraphs department.

The shop paper of the Western Electric Manufacturing Company also is devoting space to the old timers. One of the features of an issue is to have several of the older workers tell how they came to work for the Western Electric, and their experiences up to date.

W. J. A.

### WHEN WAGE RATES ARE RAISED

WHEN an employee of The American Rolling Mill Company is thought worthy of an increase in pay, his foreman fills out a card like that shown below,

Recommendation for change in rate _____ 19____

Mr. _____

I recommend the following change in the

rate of _____ Check Number _____

Present position _____ Rate _____ Per _____

Proposed position _____ Rate _____ Per _____

rate

Change in position to commence _____ 19____

Signed _____ 19____ _____ Foreman

Countersigned _____ 19____ _____ Department Superintendent

Approved _____ 19____ _____ General Superintendent

Recorded by Employment Bureau _____ By Timekeeper _____

(over)

RECOMMENDING A RAISE IN WAGES

On the front of this card the foreman enters the details necessary for the clerical work incidental to an increase in wages. The answer to the last question on the reverse of the recommendation has considerable emphasis in deciding whether the man is worth promoting to positions of higher pay and responsibility

Give full and complete reasons for change recommended

Does he use intoxicants? _____

which must be approved by the department superintendent and the general superintendent.

The face of the card gives the details as to present and recommended rates, but the back shows the reasons for the raise. N. C. F.

### GIVING TITLES TO JOBS

THE employment manager frequently finds it well worth while, in order to cooperate with the shop, to agree with other officials upon names for different jobs for which he is asked to provide men. The idea of this is not to make the minor job appear of undue importance, but simply to furnish labels in order to avoid misunderstandings and in order to impress the applicant with an appreciation of his own work.

As suggested some time ago by R. J. Bourke, of the Detroit Steel Products Company, in a paper written for the American Academy of Political and Social Science, it is important in any plant to get up an organization chart or tree. This chart ought to show the structure of the business in a graphic manner and list the different kinds of work so that each job for which a man is hired has a title.

By using these titles exact work referred to soon becomes known. Along with their use, the employ-

ment manager must, of course, have a good knowledge from actual shop observation or experience of just what the work is. He is then in a position to explain to the applicant intelligently what he is entering into, and when the man is hired he can send him to the proper foreman, who understands the exact subdivision of work for which the new man has been taken on. W. F.

### GETTING MEN TO AND FROM WORK

IN large cities, getting factory workers to and from their work does not offer the same disadvantage that is found in smaller towns. This is sometimes a serious problem, one which the manager has to solve to the satisfaction of all. One of the most common-sense ways of accomplishing this is that adopted by the Clark Equipment Company, whose plant is situated in a small town.

Many of the men working here come from surrounding villages, some of them from as far as 16 miles away. The company has two busses which are run to pick up the men who do not live too far away. As for the rest, some of them own automobiles of their own and the others ride with their friends or walk.

Some time ago a proposition was made to those owning machines. They were asked to take one or two men living near them to work and back in their machines. This suggestion has been carried out successfully, and has practically done away with time lost due to tardiness. A man owning a machine is allowed an average of about 30 cents a day by the company for every other man he agrees to carry back and forth.

In this way, not only is the slight extra trouble of the machine owner repaid, but he is given pleasant company on his way. Here is an easy way to prevent tardiness when the whistle blows for the day's work to commence. N. C. F.

### HOW MAGAZINES INFLUENCE ONE OFFICE

AN executive of a New York manufacturing plant, realizing the store of useful information and data furnished by magazines devoted to modern industrial management, determined upon a helpful plan to interest his junior executives in the magazines, and also to get them to read them critically and intelligently.

The company was a liberal subscriber to this class of magazines. These magazines upon being received were labeled with a tag posted on the front cover. The form of the tag is shown below. Once this tag was placed upon the magazines they were circulated among the executives, who signified whether they had read it or not, or any other comments they cared to.

If an article particularly appealed to a junior executive, he could request a copy made of the article to be returned to him for his own information and file.

The last man to receive the magazine was the general manager, who could tell, by looking at the cover form, which of his men were reading the magazines, and which ones were actually benefiting by them.

MAGAZINE TO BE SENT TO

| Name | Read | Forwarded | Comments |
|---|---|---|---|
| Mr. Brown | yes-B | 3-5 | Please photostat pages 325 to |
| Mr. Jayson | yes-J | 3-8 | None |
| Mr. Jones | yes-J | 3-12 | None |
| Mr. Black | No-B | 3-16 | Please copy & return Page 10 |
| Mr. Quinn | yes-Q | 3-24 | None |
| Mr. O'Donnell | yes O.D | 3-25 | None |
| Genl. Manager | Notes | JBS | Genl. Mgr. |
| Library | | | |

CHOOSING THE MEN WHO HELP YOU THINK

One executive passes around to his subordinates the magazines dealing with management problems. The magazines come back to him with notations and remarks, and he knows they have generated some ideas in the minds of the men

By shrewd and adroit questions sandwiched in between other business at his weekly conferences, this executive was able to further judge of the results of his men's reading. R. R. J.

### SERVING WORKERS WITH THE SHOP PAPER

A GOOD policy for a shop paper is to keep in mind the interest of the workers. This is well worked out in the paper published by the Republic Motor Truck Company.

An instance of this is the notice of the top of the want ad column which reads: "There will be no charge for these, but on account of limited space we will publish them two times only unless notified to continue."

In the columns following are miscellaneous wants expressed. Also "lost and found," "for sale," and anything which is beneficial to the men. C. H. M.

### OBTAINING A CHECK ON ABSENTEES

SIX months ago one manager tried a new plan to get reports from employees who were to be absent from work. One thousand postal cards were printed and distributed among the men, asking that each, if absent, mail a card properly filled out, stating the cause of his absence, even if for one day, and, if possible, about how long he would be absent.

The plan has worked admirably. Out of 492 absences, 406 reported by card, 72 requested our nurse to visit their home, either in behalf of the man or his family. An absence without a mailed excuse card is now regarded as an unexcused absence which counts against the man on his personnel record.

If you have trouble from unexpected absences among your men—and what executive has not?—why not make it easy for them to notify you by furnishing postal cards without cost? N. M. T.

### "WHERE DOES TONY LAPENSKI LIVE?"

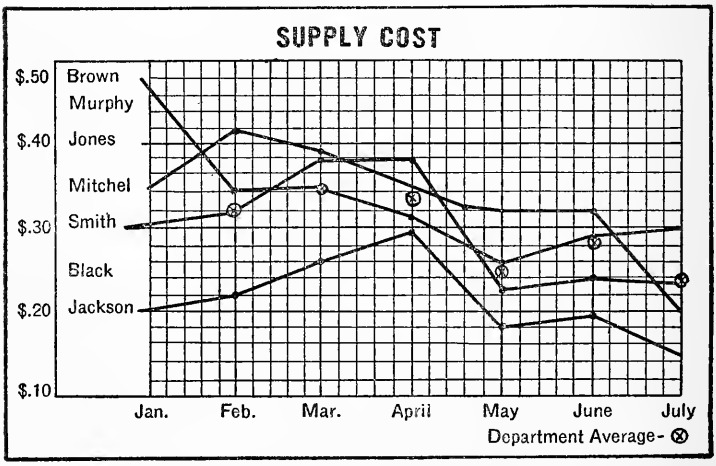
IN many plants it is desirable to have ready references which will give the names and addresses of the men together with other information about them.

In one such plant a vertical visible file is mounted on wheels. The file contains a card with each man's name, department in which he works, his nationality, home address and home telephone number.

During the day this index is in the employment department. During other than working hours it is moved to the central telephone operator's office as the operator is on duty day and night. E. R. S.

### HOW CHARTS ECONOMIZED OFFICE SUPPLIES

ORDINARY office supplies, such as pencils, erasers, scratch-paper and the like, are sources of thoughtless waste. In most cases the only thing needed to




INDIVIDUALIZING OFFICE WASTE

**This chart shows how each office worker stands in value of office supplies used. The crossed circles show the average for the department each month. Clearly there is a tendency to save**

cut this waste to a minimum is to call the office worker's attention to it in some vivid manner.

In order to keep the cost of office supplies at the lowest point, one Ohio office manager has placed a graphic monthly representation of each department's consumption before the members of that department. The cost of each article is considered when computing the total amount of supplies used.

Each employee is charged with the cost of the requisitional article, and at the end of the month his name, with the amount used, is entered on the chart which is posted in the room. Only the articles in common use are entered.

The saving effected over a period of six months is due entirely to calling the employees' attention in this graphic manner to the way their supplies used mount up.

In turn, each department, as a unit, expressed in each man's cost, is charted and posted in the general factory manager's office. Placing this little item of expenditure in such a form has greatly decreased the cost of office supplies for the entire company. The competition resulting between department managers in trying to keep their department cost the lowest, adds greatly to the force of this method. R. V. W.

### "BROTHERING" NEW EMPLOYEES

THERE is no doubt that when a man is new and green, he is seen at the very worst advantage. This period, too, is the time when he costs his employer the most, and when he is most liable to have accidents.

The general manager is not able to greet each new man personally and make him feel at home. This function he must leave entirely to the man's fellow-workers. The Corn Products Refining Company in an attempt to get its men interested and active in this has put up the following bulletin:

"Do you remember the time when you were a new employee? Perhaps it was not so long ago, or possibly it was many years ago; but every workman here was a new employee at one time. Didn't everything seem strange to you at that time—the plant—the machinery —the men?

"Perhaps there was one man in the department who greeted you with a smile, and who occasionally gave you a 'tip' on how to do your work more easily. At noon this same man told you how to 'check out,' and showed you where the best place was to eat your lunch. And at night he showed you the best way to get to the street.

"You learned to like this man and looked to him for any information you needed about your work. And if he told you that a certain job was dangerous you paid more attention to it than if a safety inspector had told you about it.

"When we have new employees coming into the plant, every old employee has a great opportunity and duty to perform toward these men. Treat them as you would like to be treated if you were in their place. Show them where they are likely to get hurt, and set a good example by being careful yourself.

"It has been said that a new employee is as dangerous as an unguarded machine, for he is likely, through lack of knowledge of his new surroundings, to injure others as well as himself. This is true until the new man has been made to realize the dangers connected with his occupation. The sooner you help him realize this, the sooner will he and you be safe from accidents. Give the new employee the 'glad hand.'"

It is more often through thoughtlessness than intention that old employees fail to get into touch with a new man. Bringing the matter to their attention is often sufficient to change the whole atmosphere of the shop. L. P. F.

### RUNNING A SHOP ON A BUDGET

BUDGETS are commonly associated with the office end of the business. That their use out in the shop itself, however, is beneficial is proved by the methods employed in the Detroit Vapor Stove Company.

Here the producing labor is budgeted by departments and the budget posted plainly for every shop worker to see.

One of these departmental budget boards is illustrated on page 117. On the board the department labor to be allowed is figured from the number of pieces actually produced at the piece work price, and the production percentage is worked out by taking this figure against the actual payroll for the same period.

The foreman of any department whose production shows a falling off of a considerable amount below the percentage that should be obtained is subjected to more or less discussion by his fellow men.

The management has found that these budget boards out in the shop tend to spur on the men in healthy working competition. R. R. G.

## CONTENTS—SECTION VIII

## LABOR SAVERS



*See also items in other sections:*

## SECTION VIII

## LABOR SAVERS

### ENAMELING IN SPOTS

IT is curious how long an old-time method will be adhered to although it may contain operations which can be performed in a much easier way. For example, in one factory, the product of which is spark-plugs, the porcelain portion of the spark-plug was sprayed with a glazer. The hard part of the operation was that the central part of the porcelain had to be left rough, without any glaze on it. In other words a band around the center was required to be left unpainted.

For a long time this had been done by slipping a collar around the porcelain section and so preserving the central part from having enamel sprayed upon it. A large number of porcelain sections were placed in an upright position upon small vertical mandrels. Each of these mandrels was turned slowly by gears from below.

As the porcelains revolved they were brought before the spray and so received their coat of glaze. It took considerable time and trouble to slip the protecting bands upon the porcelains before painting, then to remove them afterwards. Since the porcelains revolved in a horizontal plane, one of the men experimented holding a thin obstruction in the spray itself at varying distances from the nozzle.

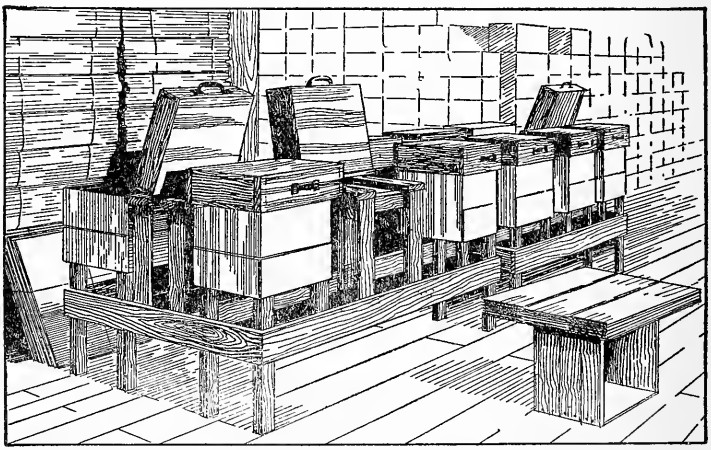
When the best distance away was found, the obstruction or shield divided the spray of glaze into two

parts, each of which painted the ends of the porcelains. This left the desired band in the middle unpainted.

L. I. T.

### A BENCH TO MAKE FIBER CARTONS

THIS picture shows a home-made bench employed in the preparation of fiber shipping cases. Each bench is made to handle six boxes. Two benches are used at one time by a single workman. Built of ordinary two by fours, each bench carries forms of proper size, by means of which the containers are



WHERE ONE MAN DOES THE WORK OF TWELVE

The cartons are shaped on forms—six to a bench. Boxes filled with bricks hold the flaps in position while being stuck. By the time the last carton is made, the first is ready to be taken from its form

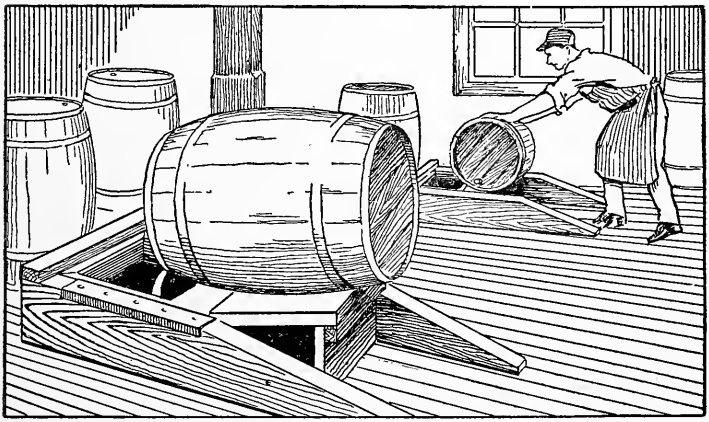
held open and in an inverted position. The bottom flaps of the box are then bent into place and the adhesive is applied. A cover filled with brick and weighing about 45 pounds is then let down upon each flap to hold it securely in position until the adhesive has set.

When two benches are operated it has been found from the experience of this factory that the first box to be glued can be taken from the form by the time the operator has completed the round of the other eleven forms. One man can prepare 100 boxes an hour when working on benches of this sort. Obviously, the saving in both time and labor is a factor in cutting production costs, which is worth while considering.

C. S. D.

## MAKING FRIENDS WITH GRAVITY

IF they think about it at all the best way to utilize gravity is a perpetual problem with factory executive. It is sometimes remarkable how long a laborious custom can exist before one discovers it to be laborious and expensive and a simpler, easier way substituted. This is clearly brought out in the case of one factory where for years it had been the custom to drain oil barrels in what was always considered the logical way.



**NOW ONE MAN CAN EMPTY THESE BARRELS**

When it was necessary to raise barrels of oil to drain them it was hard work for two men. Now one man can do it easily. There's not only saving in human energy, but a reduction in manufacturing costs as well

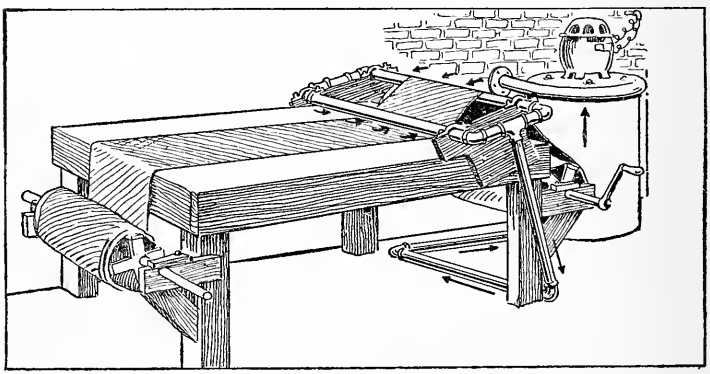
Their method was to assign three or four men to each barrel, have them hoist the barrel two feet into the air and slip a container underneath to receive the oil.

Nowadays one man does the same work more easily than several men did before. The illustration on page 113 shows why. The barrel is simply rolled on its side to a particular spot in the floor of the room. Here there is an opening through which the oil drains into a tank on the floor below.

It is a comparatively safe wager to say that the manager of any factory—no matter what improvements he already has made—can find still more ways in which gravity might be made to work for him at a wage of nothing at all. R. G. G.

### VACUUM-CLEANING RAW MATERIAL

NO doubt 50% of the operations in a factory involve the idea of cleanliness. At least there is that percentage of operations benefited by keeping the work clean. The vacuum cleaner is coming to be used more and more in manufacturing, not only because



TAKING THE DUST OUT OF A FABRIC

The tire fabric passes between two pipes with slots in them, as it is unrolled from one cylinder to another. Besides thoroughly cleaning the material, it is a simple matter to inspect it for flaws at the same time

it is capable of extracting dust from inaccessible spots, but because it does the job more thoroughly than can usually be done by other means.

Here, for example, is the way the vacuum cleaner principle is used in cleaning tire fabrics in a factory making automobile and bicycle tires. The sheet of fabric is drawn over two vacuum pipes with slots in them. The dust is thus removed as the goods pass slowly along. It happens in this case that the apparatus offers convenient means of inspecting the fabric for defects at the same time that it is being "dusted."

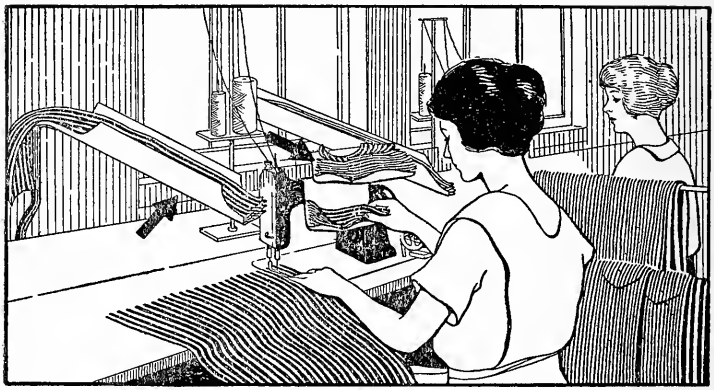
N. S. E.

### BRINGING WORK WITHIN REACH

THE ease with which a machine operator may repeat an action over and over again and not know that she is doing it in an expensive, awkward way is well illustrated by the case of one factory operator pictured on the next page. The young lady had been at this particular operation for three years before the management increased the effectiveness of her work by placing the metal trough as shown.

Formerly, every time she took a piece of material to put it into the machine she was reaching from two to three times as far for her work as was necessary. At that time part of her work was in the trough behind the machine and part of it at the end of the machine. Consequently every reach was not only an arm reach but a body reach, as it was necessary for her to bend her whole body to get the part which she needed.

"Our first move," explained the superintendent, "was to bring the work nearer the needle. This was accomplished by making sheet-iron holders to fit the parts necessary for the particular operation. One of these was attached to the center of the machine head



HER WORK IS CLOSE AT HAND

Before the sheet-iron shelves or holders were put up this operator used to spend a large proportion of her time and effort in reaching. Now she does nearly half again as much work and with far less fatigue

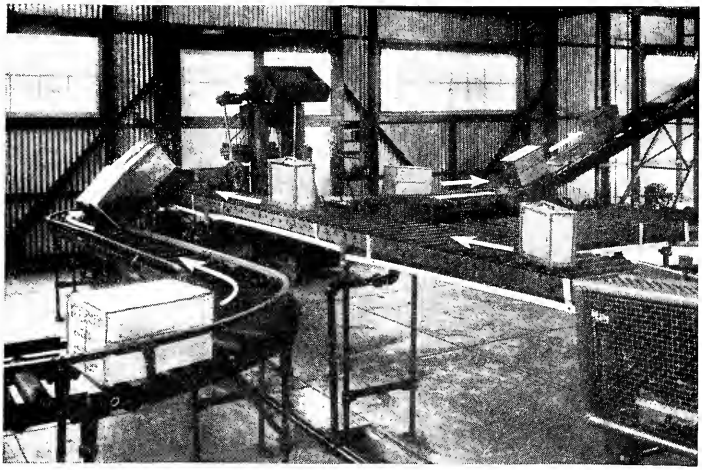
and the other placed on a stand of band iron sloping down to a point about four inches above the needle at the left of the machine.

"This is well brought out in the picture. It reduced the arm reach to about a third of what it was before and eliminated the body reach entirely. The effect of these simple changes on the output of this operator the first week was an increase of 25%."

Often an incredible amount of good can be done by stopping to analyze the simplest sort of motion required in operating a machine. This particular case is typical of savings that can be effected by a little thought along the line of bringing the work, the machine, and the operator closer together. R. V. W.

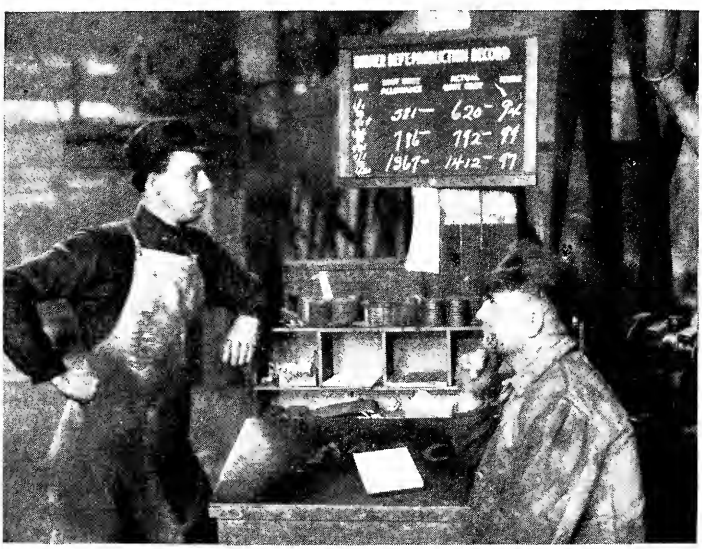
## "LAST PIECE IN LAST PIECE OUT"

"LAST piece in, first piece out," represents a condition in a great many manufacturing plants that is sometimes exceedingly hard to prevent. Take the question of bins which are so commonly used for



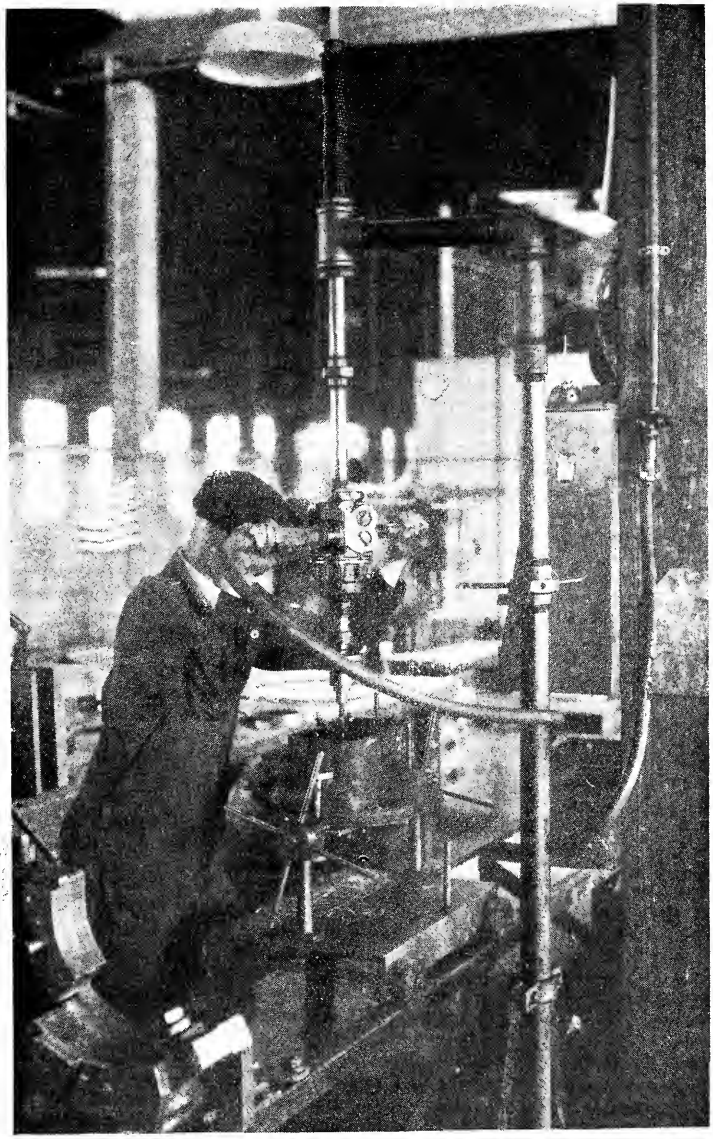
CONVEYORS THAT HELP ASSEMBLE

Cans come in on one line of conveyors and boxes along another. Where they meet, the can goes into the box and a third conveyor takes them to a boxing machine which nails the covers on. See page 65 for item




KEEPING THE BUDGET BEFORE THE MEN

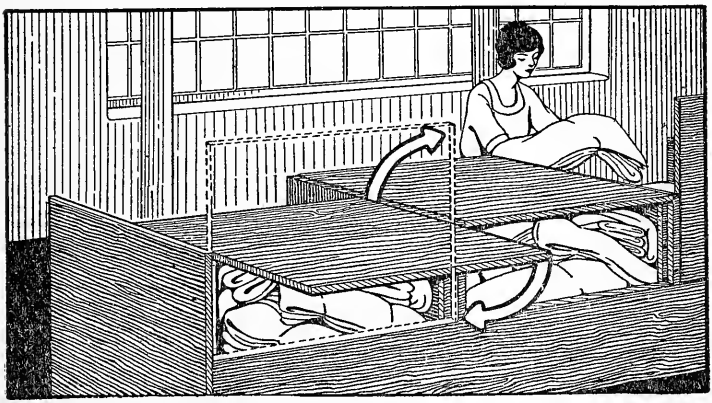
Each department in the shop has a board like this to let its men know how their production compares in cost with what it ought to be. See page 109 for item



IT'S EASY TO HANDLE THIS DRILL

A home-made frame of pipe and pipe fittings allows the air drill to swing as desired, making the whole operation quick and easy. See page 157 for item

holding materials between operations. Under normal conditions the last piece one puts in is the first that he takes out again. This is not a good condition and was prevented by the management in one factory through a peculiar cover for these bins. The idea of the cover is shown clearly in the illustration. Briefly, it is a cover designed to fit either the top of the bin or one of the two sides, but never permitting both sides to be closed at once. As can be seen from the picture, the top or a portion of one side of the bin is left



FILLING AND EMPTYING PROCEED ALTERNATELY

Where ordinary bins are used for storage between operations the last material in is the first out. The pivoted top as shown in the sketch prevents this and provides that material goes through in "commercial order"

open except as it is closed by the removable top. This entirely covers the top of the box or may be slid to one side and then swung on a pivot to the vertical plane to cover the side opening.

Thus the box is open either at the top or at the side, but never at both at once. Goods are put in at the top from one side only and when the box is filled the top is closed and the opposite side opened, from which the goods are removed. Each bin is completely

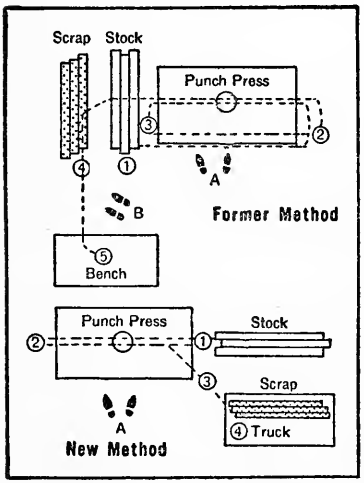
emptied once it is started. In this way none of the material becomes sidetracked by getting into untouched layers of a pile.

A bin or hamper of this sort is a great help in permitting orderly progression of factory work. By reversing the confusing order of things the first material dumped into the bins becomes the first taken out and the last in is the last out. N. C. F.

## MAKING HEADS SAVE HEELS

OFTEN a simple and inexpensive rearrangement of machines and benches will make a decided change in the cost of an operation. Take for example the before and after arrangement of this punch-press.

By the old method, two workmen were required. Operator A picked up a strip of metal from the pile at "1," turned to position "2" and punched one row of holes. He then reversed the stock at position "3," moved it back to "2," punched a second row of holes and set the work down at "4." Operator B picked up the strips from position "4," transferred them to the bench at "5" and wired them together in bundles of 25 so that they could be conveniently moved.




CUTTING LABOR IN TWO

By rearranging the positions of stock and punch-press, and substituting a truck for a bench, a helper's time was eliminated. Also the better arrangement enabled the operator himself to turn out more punchings in the same time

With the new arrangement, operator B is dispensed with. Operator A now picks up the stock at "1," passes it through

the press to position "2," back again through the press from "2" to "3" and deposits the strips on a truck close beside him at position "4."

The time saved by operator A was 18.5% and as was said, the entire time of the helper was done away with. The total time for the operation, which previously required 34 3-5 seconds, has been reduced to 28 1-5 seconds.

This plan is obviously adapted to many operations, but is used surprisingly little. There are few places where at least one operation cannot be eliminated by a little thought and imagination. L. I. J.

### COUNTING SMALL PARTS RAPIDLY

THE All-Steel-Equipment Company manufactures many small parts for the trade which are packed in cartons holding a hundred each. The actual counting of these parts when cartons are filled has been in the past a matter involving considerable time and a certain degree of inaccuracy. To overcome these factors a counting tray, as shown in the illustration on page 161, has been devised which not only hastens the operation but eliminates most of the errors involved in the count. The tray, which is made of thin sheet steel, measures 18 x 24 inches. It is 9 inches deep on the back and slopes to a 3-inch depth in front where an outlet is provided that leads to a basket rack for holding the carton in position. A moveable "wing" permits of the outlet opening being closed in case it is desired to carry the partially filled tray from one place to another.

In operation the method of handling is exceedingly simple. The operator is seated before the tray which may contain several hundred of the small parts to be counted and boxed. An empty carton is placed in the rack. The counting is done by fives—the operator

using the thumb and forefinger of the right hand and three fingers of the left hand in order to separate five parts, or pieces, from the pile in the tray. As soon as these have been laid hold of, the hands are brought forward and the pieces are swept through the opening in the front of the tray following which they fall into the carton. Twenty motions of the arms results in exactly 100 parts being swept into the box. With a little experience the work can be done with great rapidity and with slight chance of error. O. C.

### INSPECTING SMALL PARTS EASILY

TO make the inspection of small parts a task which could be done quickly, accurately and without undue fatigue, one company constructed special

**THE END IS SPEED AND ACCURACY**

**Work is less fatiguing at this conveniently arranged table, and the inspector can segregate repairable parts**

tables which it has found most satisfactory. Some of the ideas incorporated in these tables, one of which is illustrated on the opposite page, are well worth the consideration of factory men.

In the first place, the feed chute is equipped with a sliding door to retard the flow of parts to the table. Then guide strips fixed on the surface keep the parts from falling off the table and also keep them within easy reach of the inspector.

One of the chutes leading to the deep tote boxes, under the table illustrated, is for acceptable parts. The other is provided for those parts which, though faulty, can be put in acceptable condition by the repair man. All parts rejected are thrown into the table-high boxes on the right of the inspector.

Work may be rejected for several reasons, and it is necessary to the best production methods to know what proportion of rejects are traceable to each fault in manufacture.

The height of the table and the position of the chutes are designed to reduce to a minimum the fatiguing effect of the work. C. S. D.

### HOW TO PAINT SMALL BOLT HEADS

MANY manufacturers of steel products—such as office furniture, cabinets and wardrobes—make no effort to paint the heads of the bolts that are used owing to the fact that such work involves ordinarily an expenditure of time that seems quite out of proportion to its value. The All-Steel-Equipment Company, however, uses a method for handling such work which is very simple and effective. A sheet of thin steel, about 24 x 36 inches, in size, as shown in the illustration on page 161, is perforated with holes of proper diameter to admit the bolts. Into each of these holes a bolt is slipped. When the openings are all filled, 1,800 bolt

heads are in position for painting, which can be done either by a brush or with a spray without liability of the paint getting into the threads of the bolts on the under side. When the form is being filled the sheet of perforated steel is laid upon an open rack which holds it securely in a horizontal position. It requires about 40 minutes to fill a form holding 1,800 bolts.

O. C.

### THE BICYCLE WHEEL HOLDS THE WORK

SMALL pieces of odd shapes are sometimes hard to handle and to feed through machines. The Amphion Piano Player Company was annoyed by this difficulty until it found a method of feeding so simple that it should be applicable in many other operations.

The pieces to be handled consist of small wooden blocks which must have a shallow slot cut along the two opposite sides. The slotters are a pair of horizontal circular saws, far enough apart so that the blocks pass between them horizontally and have both slots cut at once. Each little block is hollow and is really only a shell; therefore neither slot must be too deep, otherwise it will go through the side of the shell and leave a hole which is not permissible, for the wooden shell is to form an air chamber to regulate the striking of a piano note.

The blocks therefore have to be fed through the machine by a guide in the shape of a channel iron, so that the pieces cannot deviate to one side or the other. The difficulty was to hold the pieces down on the bed of the channel while they were passing through the machine between the two slotters. The top of the block is not quite flat, but has a lip protruding upwards near one edge. This prevented the use of a flat clamp or holder. Holding the pieces down with the fingers between the cutting blade was awkward, dangerous and too slow.

An ordinary bicycle wheel, with a pneumatic tire, as shown on page 161, solved the problem. The wheel was mounted in a bearing supported by rods, above the table of the machine. The center line of the axis is just far enough above the table so that the bicycle tire at its lowest point presses firmly upon the wooden pieces as they come through the machine. The pressure is similar to that of human fingers. The slight lip protruding above the top of the block does not interfere with holding, for the elastic air-filled tire yields to it without losing either contact or pressure.

Occasionally when the feed gives a little trouble, the tire is pumped up again and the trouble disappears as it is usually due to wrong pressure upon the work.

P. F. O'S.

## CONTENTS—SECTION IX

## WAGE-PAYMENT PLANS AND MAINTAINING EFFICIENCY



*See also items in other sections:*

## SECTION IX

## WAGE-PAYMENT PLANS AND MAINTAINING EFFICIENCY

### TIGHTENING UP ON PUNCTUALITY

ONE manufacturer whose employees often forgot to ring their clock cards got results by posting near the exit a large sign which read: "Did you ring your clock card?" To keep the employees aware of the sign and to prevent it from becoming a landmark, it was illuminated one day by a red light, the next by a blue light, the next by a red light, and so on. This idea works very effectively.

Then there was the matter of tardiness, which became very troublesome. It was remedied by the following method: The card racks were closed promptly at the beginning of the factory hours.

All employees who were late were then obliged to come to the office to report. They were then given a red card, which was placed in the rack in place of their regular card.

This card marked them as being late and they kept the card for the rest of the week. If during that week they were late again they were docked half an hour, and for every time they were late thereafter they were docked double the amount.

That this worked well is putting it mildly. The colored card makes the tardy one a marked man—for so many employees think that they can get by—and his record is watched closely. N. A. M

### A DIARY FOR OFFICE EMPLOYEES

THE Western Electric Company places a cloth-bound diary in the hands of every office employee outside of file clerks and others whose work is of a routine small-unit-job nature. Each one receiving such a book sets down a record of all work done each day, together with any remarks that may seem essential for future reference.

One reason for establishing the "Diary Habit" is that the time of each man in each department must be charged to the proper account, such as analysis, for example. For that reason each job must be listed under the proper head, and followed by a notation of the time spent on it.

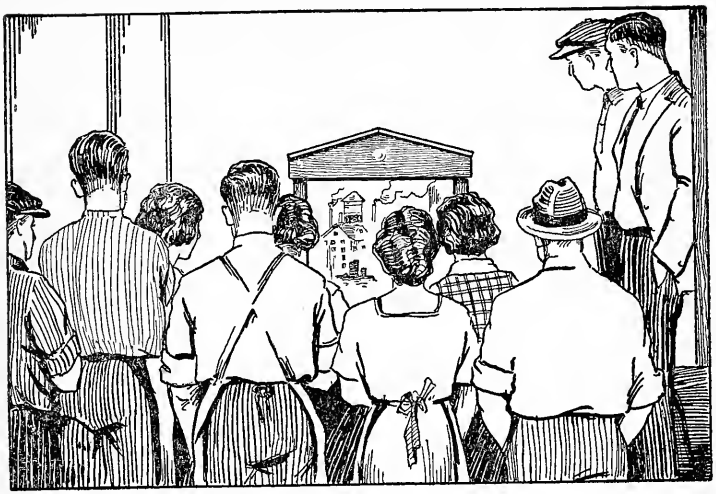
But the real value of the book is that the employee has a check upon his own work. Any question of receipt or completion of a job is quickly answered by a glance at the book. There is no need to run through a lot of records or to bother with red tape, when a job is being traced. J. C. N.

### CAPITALIZING THE NOON-HOUR

WITH the demand for greater individual production some means of training every worker in the knowledge of his job is absolutely necessary.

The Dayton Engineering Laboratories Company realizes the value of training each worker in the plant, and in line with the thought that an economy of time and money must be expended to this end, has developed a plan for using the noon-hour as a time for pleasure-coated employee training.

The managers hit upon movable movies, a lantern-slide projector to put across the ideas and, at the same time, to furnish enough pleasure to keep the workers eager for the noon-hour's "picture show." Each noon the machine is moved to a different department.



SHOWING THEM HOW TO DO IT

After the workers have watched these slides for 15 minutes or so they begin to fully realize how much they don't know about their individual jobs—and then they determine to follow up what they learn from the machine in their everyday work

What do they see?

Such matters as new construction, new designs of apparatus, new machines, features of interest in production, recreational activities, products in manufacture with an explanation as to the purposes and uses of those products, results and activities of the product out in the field, athletic activities, and all other points that could possibly be of interest to the employees are shown.

Has the company found the slides successful? Yes, indeed. In the words of the educational director, "We have found that moving pictures, especially when automatically projected, attract and retain attention until an entire series of news has been shown."

When the workers have been interested to that extent, the chances for their successful training are greatly improved. W. B. S.

### MAKING "O.K.'S" UNIFORM

VARIOUS factory records, as a rule, are o.k.'d by foremen and other head men only. A little uniformity in the method in which the o.k. is applied saves the Bessemer Gas Engine Company considerable time. This company sent out elaborate yet clear instructions to foremen regarding o.k.'ing of time cards, so that the pay clerks might understand the marking. Some of the instructions follow:

"When the ringing on the clock is entirely regular, merely put your o.k. and initials on the Sunday line.

"If the workman has forgotten to ring 'in' overtime and aims to show that he worked from 1:00 to overtime 'out,' draw a line from afternoon 'in' to overtime 'out' and write your initials over it.

"Should any space not have been rung, write your initials in it, thus showing that the time should be counted for the regular period of that space.

"Night foremen are requested to have their men ring 'in' and 'out' under overtime."

This is one example showing how clearly some executives realize the importance of uniform o.k.'s. In this manner considerable time is saved and routine work is greatly simplified. G. M. H.

### ONE WAY TO CATCH COMPLAINTS

THE timekeeper of an eastern metal-truck concern used to have from three to a dozen callers in his office every pay day after the envelops were distributed. Their errand was to protest a mistake made in computing their pay and to secure a little more money they felt was due them. Usually the timekeeper had little difficulty in proving that the men themselves were in error. The principal cause of the trouble was the confusion on the piece-work rates of the various castings and the operations on them.

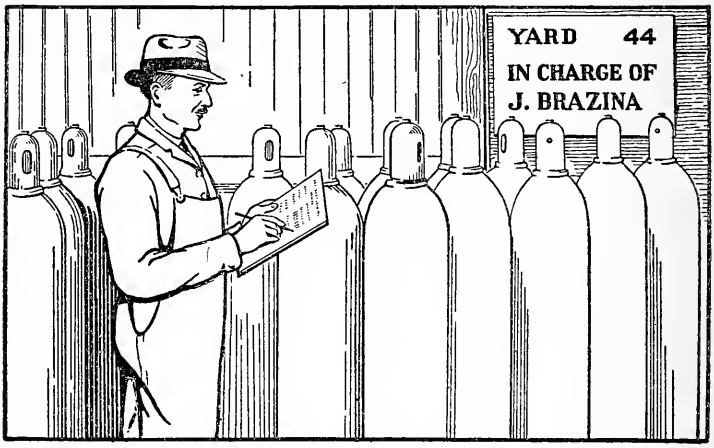
A little thought resulted in the making use of a little plan which has served its purpose well and has cut down the former weekly visits to a very low figure. A small rubber stamp was secured with the word "Rate" on it a half-dozen times and space enough after each one for the piece-rate on the operation to be inserted. This stamp is pressed on the back of each traveler that leaves the superintendent's office and the time clerk fills in the price of each operation necessary to complete the job covered by the traveler. Very seldom are more than six operations necessary, but in case there are seven or more the stamp is used twice. Each man handling the material covered by the traveler can simply turn it over and see without trouble what the rate for drilling, reaming, threading, and so forth, is at that time.

There is a little time required on the part of the timekeeper, but he is satisfied to use the plan since it has taken away very unpleasant work. S. E. S.

### RESPONSIBILITY MAKES BIGGER MEN

ONE of the best ways to develop a man's capability for assuming responsibility is to make his the sole responsibility for a job. Having acquitted himself with credit in one position, he has attained a broadened experience, he has developed a changed mental aspect toward his work, he has become sobered. Then he is ready to assume more and greater responsibility.

A poster placed in view of the worker, and reminding him that he is in charge, makes him realize that he really has a duty and a trust. He knows also that his fellow-workers recognize his responsibility. In that sense, cards of this kind have been mutually beneficial in the plant of the Hydraulic Pressed Steel Company. They have given the company a means of visually




OFFICIALLY IN CHARGE OF THE JOB
This man takes more pride in his work because his responsibility is "published to the world"

expressing an appreciation of the worker's responsibility. They have helped to make the worker worth more to himself and to the company. S. A.

### NOW HIS CLERK NEVER FORGETS

NEARLY every factory office has a tickler or follow-up file in which are placed all the correspondence and notes that have been set ahead for future reference. But, unless these files are consulted regularly the first thing every single day, they are likely to be worth little or nothing. One New England factory office manager had a clerk of the type that had to be reminded to look in the follow-up file. He used an interesting little device to remind her of the file the first thing every morning.

On the post immediately below the hook on which the clerk hung her hat every morning, he had tacked a small typewritten card to remind her that her first duty was to look in the follow-up file. By placing the

card immediately below the hat hook, the hat or coat hanging on the hook covered up the card during the day. It performed its service the first thing in the morning and then retired from view. C. A. A.

### TELL WHO YOUR VISITORS ARE

THERE is always more or less talk among the workers in a plant as to who the various visitors are.

The management of Cluett, Peabody and Company devotes a portion of the space in each issue of its shop paper to the names of people who have recently visited the plant. If the curiosity of the workers during the visit is any criterion, this section of the paper will be read with considerable interest. C. P. C.

### WIDER USE FOR TECHNICAL MAGAZINES

IN one plant the technical magazines which are received are first read by the engineers in the office. They are then placed in a box made especially for this purpose, at the employees' entrance. Any worker may take one at a time home, and after reading it, return it to the box so other employees may read it.

C. T.

### SELLING SAFETY TO WORKERS

A PROFITABLE plan is being used in the General Electric Company, to keep the safety idea ever before the eyes of the workers. Believing in the old adage that experience is the best teacher, the medical department takes advantage of the workman when he comes to the hospital or dressing room for treatment, by demonstrating the use of various safety devices which will prevent him from having this same accident again.

A display case is fitted out with hand protectors, canvas and leather, for men handling rough castings,

scrap, and so forth; leather mitten for same use in winter; asbestos mitten for handling hot materials; tongs for pulling and replacing high-voltage fuses; tongs for pulling and replacing low-voltage fuses such as are commonly found on machine tools, and so forth; goggles, cap for women employees; knuckle guard for wheelbarrows or 2-wheel trucks; respirator; foundry shoe; foundry legging; safety set-screws; and an individual sputum cup. This case can be easily taken down from the wall so the physician can explain the use of any one article to the workman.

All of these articles are supplied free of charge to the employees, but must be returned when he leaves the company. Otherwise they are charged off on his last week's pay check.

The case is so located that all but the most severely injured employees are obliged to stand or sit directly before it while a record of the injury is taken. In this way ample opportunity is afforded the workman to ask any question he may desire, or for the physician to offer any suggestions. I. W. A.

### HELPING FOREMEN TO REMEMBER

OFTEN the wide-awake factory man can borrow an idea that he can use from the sales department. The following incident shows how one man did it with advantage.

The sales department of this factory had in operation a follow-up system in which the salesman recorded on an index card the date and subject of any matter which he desired brought to his attention later on.

This card was filed away by a clerk who placed it behind the tab indicating the date it was to be brought to the salesman's attention. This method eliminated all of the uncertainty and possibilities for oversight which the individual desk calendar gives.

The system worked out so well in the sales department that the factory manager suggested, at one of the conferences, that a similar scheme be placed at the disposal of his various shop heads and foremen, since these men frequently found it necessary to plan ahead and to look up result or other data at some future date.

Usually the foremen did not have the advantage of the office facilities and assistance offered in the

Month August Day 31 Year 1921

On the above date bring to the attention of

Mr. John Wright

Time Study Department

the matter of Checking the production increase in lathe room due to revised layout per P/PD-17

Date 3/25/21 Signed John Wright

DOING AWAY WITH FORGETFULNESS

No more "I forgot" statements are made in this factory office. The above card is always "on the job" to follow up men with unreliable memories

office proper, and since they had to rely on their own memories or notations for these "follow-up" or "tickler" notices, quite often important matters were overlooked or forgotten.

Consequently these "bring to my attention" cards, one of which is shown above, were delivered to the various shop heads and foremen. The index system was placed in charge of one of the shop office clerks, so that now these men can arrange for future

plans, or checking up, without being under the strain of carrying the detail as to dates and similar memoranda in their memory or scattered note books.

N. B. S.

### AVOIDING CLASS DISTINCTIONS

TOO much attention cannot be given to the avoidance of making distinctions betwen office and factory workers.

In a recent parade in a small Ohio town, all of the employees of one plant, office and factory, participated.

The president of the company arranged for automobiles to transport the office women. In the shop are also many women workers, but the discrimination did not occur to the president until one of the women executives tactfully suggested it to him.

"Why not let the office girls walk, too?" she asked. "I'm sure they will be willing to do so, and the girls in the shop will feel so much better about it."

"Yes, and, by George, I'll head the procession," said the president.

The force turned out 100% strong, all on foot. After that there were no such distinctions made in that company and the workers are better satisfied.

O. R. B.

### GETTING MORE REPORTERS

INSTEAD of asking for volunteer reporters for an indefinite period, the editor of the shop paper at the Western Clock Company has the foreman of each department appoint one of the workers to gather news for three months. When this period is up the editor sends a note to the foreman asking him to thank the reporter for his services and to appoint another.

At the same time the reporter gets a letter from the editor saying that he has appreciated his cooperation

and service and hopes that he will help the new reporter by continuing to turn in items.

While it is not an inflexible rule, the editor also indicates to the foreman that it may be preferable to appoint a woman for one term, a man the next, and thus alternate back and forth, especially in departments where the women workers are about equal in number to the men.

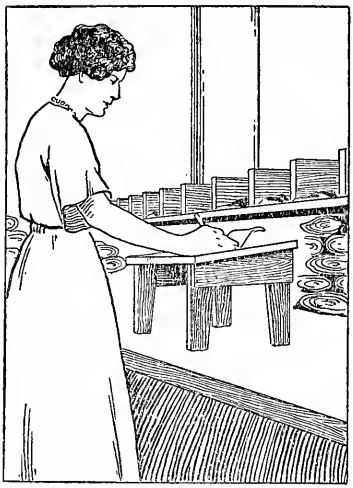
The reporter turns the items over to the editor through the foreman. By making the foreman thus partially responsible for obtaining news he is more likely to follow up the reporter to see that items are turned in.

The name of the reporter is also printed with each department's news. This mention is considered as an honor by the workers. P. V. T.

### RESTING WITHOUT INTERRUPTING THE WORK

WHERE a woman operator has to remain in one position at her work for a great length of time both the operator and the work suffer. At the plant of Cluett, Peabody, and Company, Incorporated, the girls use a collapsible table and adjustable foot rest as shown in the two illustrations on the next page. When she stands at her bench she works on a little table as shown at the left. If she wishes to be seated at her work the small table collapses as the right-hand view clearly illustrates, thus giving her a convenient work space. The feet rest on an adjustable swinging foot rest, as the girls are seated on high legged chairs.

By using this collapsible bench the work is of the same relative height whether the operator is standing or sitting down. In this way she can work in either position with equal facility. She does not have to stoop or bend to her work if she desires to stand a few minutes for a change, which gives her a good rest.



MAKING STANDING EASY

Workers who sit most of the time often are refreshed by standing up a while. This table brings the work to proper height

RESTING WHEN SEATED

Here the same small table is seen folded, thus providing a convenient work space. An adjustable foot rest prevents the feet from tiring

The principle of this little idea is particularly good because it prevents fatigue without really interrupting the work. N. Y. T.

### HELPING YOUR MEN SUGGEST

VALUABLE suggestions come from the workers in any kind of manufacture. Recognizing this, many plant managers arrange to have their men help in making suggestions. For example, the Minneapolis Steel and Machinery Company explains to its employees that its foreman or department head stands ready to help them get their suggestions into good shape for the suggestion contest which is carried on.

There is also a suggestion secretary, part of whose job is helping in the same way. Any employee is urged to telephone this secretary or leave a call for

him and he will arrange a meeting at which the man will be helped in bringing his suggestion "right down to brass tacks."

The personal touch not only gives the worker more enthusiasm toward thinking out and suggesting to the company practical plans, but helps the manager also, because when the sketches or descriptions are turned in, they are in better shape for quick and thorough examination. H. F. A

### APPEALING TO THE TRUCK DRIVER'S PRIDE

AS an aid to making its drivers realize that it is to their advantage to keep their trucks in good running order all the time, one factory paints the driver's name on his truck. His name also appears over his parking space in the garage and just below the number of the truck on the report sheet.

It makes a driver feel pretty good when he takes out his truck in the morning and sees "Tom's Truck" printed underneath the concern's name on the truck. Then at night when he puts the truck away he is confronted with the notice: "This space is for Tom's Truck." When he makes out his report he sees under "Truck 122," "Tom's Truck."

All these repeated appearances of his name make him feel that he has a special interest in his truck and that he ought to keep it up. The cost of keeping the trucks up has been reduced considerably and the garage superintendent has noticed a better feeling among the drivers. B. L. B.

## CONTENTS—SECTION X

## TIME SAVERS



*See also items in other sections:*

## SECTION X

## TIME SAVERS

### SAVING THE OPERATOR'S TIME

THE immediate necessity of increasing the output of a paper-box factory was the cause of an investigation that uncovered leaks in all departments. One of these deficiencies was the fact that the girl machine-operators had to leave their machines to obtain the stock which was kept in an adjoining room. There stood the idle machines while the operator took her time to secure raw stock, and, as was frequently the case, to visit with another operator.

The superintendent hired two eight-hour boys to do all of the carrying for the operators in this department. These boys supplied the operators with the baskets into which to put their finished product and took away the baskets that the operators had filled.

Before this change, one of the operators was seen to take as long as 15 minutes in her search for an empty basket. There were more than enough baskets supplied, but everybody used them and left them in no specific place.

This change resulted in a pronounced increase in the production of this department. More boxes meant less overhead charges per box. This decrease far more than covered the added labor cost of the two boys carrying.

Then, after a few months of operation under this plan, the work had become so well defined that it was

found that one of the experienced boys alone could handle the material and the baskets for all of the operators. To lighten the work for him as much as possible, the baskets were made of thin sheets of fiber on a light wooden frame. U. S. S.

### SEWING TWO SEAMS AT ONCE

THE principle of doing duplicate processes at the same time is used in machine shops, but some industries do not apply it. However, a foreman in the Graton & Knight Manufacturing Company who knew more or less about machine shop methods found a simple way of applying this principle of duplicate work to his own production.

This department of the company cuts and sews short leather straps that are used for trunk handles. Some of these straps are built up to a thickness of half an inch. In building them up, the strips or layers, already cut to shape, are laid on top of one another and then all are sewed together along each edge with a coarse thread.

When a machine with one needle was used, the strap had to be run through the machine twice. This seemed to the foreman a waste of time; it was an extra run through the machine. So he adapted a machine to run two needles at once, spaced an inch or so apart according to the width of the strap. Now the strap has both sides stitched by running it once through the machine.

The next strap is then pushed in right behind the preceding one, without breaking the thread or waiting to turn the strap around. In this way the straps can be sewed in a continuous stream. One man's output on this machine is much more than double what it was on the single-needle machine, for he not only saves running the material once through the

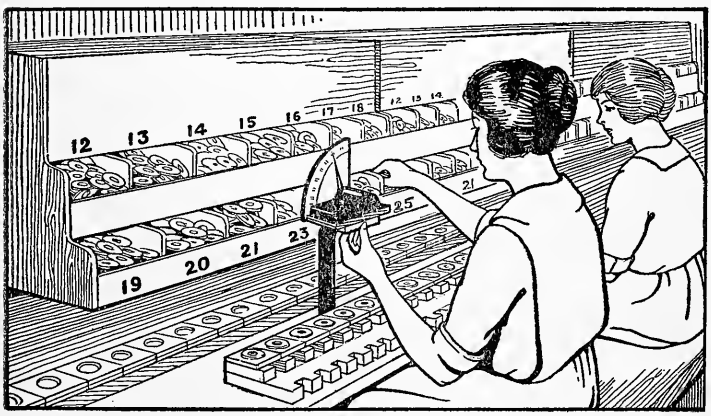
machine, but he saves two handlings of the product in process.

The double machine is a little harder to take care of and requires a careful man to use it, but with ordinary care in selecting workmen and inspecting the machine, good results are secured. P. F. O.

## SORTING ASSEMBLY WORK

ALTHOUGH the particular operation described here is extremely special, nevertheless, the way it has been worked out is likely to suggest many adaptations to other processes of assembly.

The illustration shows one part of the assembly process in the manufacture of a piano. As the small valve blocks come within reach of the operator she must pick them up and select from the bins in front of her the particular thickness of disc needed to go with that special piece. If she had to go through the routine of figuring it out each time, the work would become monotonous and would slow down consider-




THIS POINTER DESIGNATES THE BIN

By holding the block in this gage the operator can read directly the required thickness of the stems. She need only reach in the proper bin to secure it. No calculation is necessary

ably. Instead of this she uses a spring gage with a pointer. Every time she picks up a piece she inserts it in this spring gage. Automatically the pointer indicates the number of the bin containing the right thickness disc for that particular piece. It is never necessary to make a false move. It is just such little things as this that in the aggregate cut down the time necessary to assemble small factory products.

J. E. G.

### ONE DAY SAVED IN GETTING RAW MATERIAL

THE superintendent of a concern that uses a large supply of iron and steel bars found that many shipments directed to the firm were being held at the railroad platform for a day, and sometimes two, because the teamster who held the trucking contract of the firm found the handling of them a tedious job.

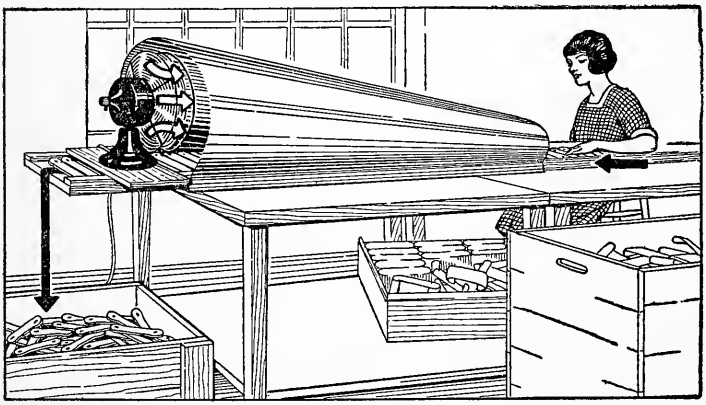
The bars measured from 18 to 20 feet long, and if put inside the freight house would make it hard for the men to get at other goods placed there. When they were unloaded from the car, they were placed in the nearest vacant spot, which usually happened to be alongside the wall of the freight house. This compelled the teamster to pull the bars through the house, a distance of 40 feet, in order to get the material on his wagon.

After the matter was explained to the manager he agreed to send a man to the freight house, when a shipment of bars came in, to help the driver load up. The shipments now receive prompt attention, as it is to the interest of the driver to get them as soon as they are placed outside the cars. This immediate attention prevents other goods from being piled on them. The help the driver gets from the man sent to him insures the work being done quickly, so in all, a day or two is saved in the handling time. M. F. M.

## SAVING SPACE IN DRYING

THE drying of lacquered pieces is a slow job at any time and may be the one job that is holding up production. The illustration reproduced below shows a home-made device that the Eastman Kodak Company is using to hurry up the drying of lacquered ends of cameras. The drying duct consists of a cornucopia of sheet metal with an electric fan in the end of it. The lacquered pieces are pushed in at the small end of the duct by hand and moved along. They are exposed to the dry air in the duct and then are pushed under the fan and fall off the end of the board into a box.

The pieces are dried when the fresh air from the fan reaches them and so the very last bit of moisture



THE FAN SPEEDS UP THE DRYING PROCESS

Before this electric fan and metal shield were used, it was necessary to spread these camera pieces out on tables for slow drying. Now both space and time are saved

is removed. The air that goes over the wet pieces just entering the small end of the cornucopia has already taken up some moisture but still has a drying effect on the very wet pieces. As this end is smaller, the velocity of air hastens the removal of the moisture.

The use of this device has saved time in drying and has reduced the amount of money paid for labor in handling these pieces. Also the space occupied by this department has been reduced because it was formerly necessary to spread the pieces over tables to dry. P. F. O.

### SAVING TIME ON LATHE WORK

A CONCERN which makes machinery on which there is a great deal of lathe work has found that the substitution of turret lathes for engine lathes will speed up many of its operations. With the engine lathe the operator places the tool in the tool post and, after the work has been properly mounted on the face plate, makes a trial cut, calipers the piece, adjusts the tool, and repeats the process until the correct size is reached.

As the tool nears the end of the cut the operator stops the machine, measures the work to see whether the cut is long or deep enough or not, and then repeats the process until the correct length of cut has been made.

Whenever it is necessary to change the tool, to perform some other type of operation, the whole process must be repeated, and, of course, the cycle is gone over for each piece made.

With the turret lathe the first set-up takes longer than the set-up on an engine lathe. After the set-up has been made, however, and the machine turned over to the operator, he has only to feed the turret and tools forward to make the cuts. While this change has resulted in increased production for the same manpower on many jobs, the company has not by any means changed over all lathes. There are many operations for which an engine lathe is necessary and the most economical. C. H. A.

### SAVING TIME WITH A SPADE

ALTHOUGH the ordinary spade is not commonly part of a truck driver's equipment, some have found it useful to have along, in case of emergency. The careful truck driver, particularly if he has ever needed something to shovel with and not had it, has considerable respect for this ordinary garden tool.

Many drivers who are called on to make trips over country roads feel safer if they have with them a small sharp spade with a folding handle which is stowed away in some small compartment. When their cars become stranded in a bad road, miles from the plant, which is sure sometime to occur, an expected hold-up of several hours is frequently reduced to a minor delay of 10 to 15 minutes. T. F. M.

### SAVING TIME WHEN TESTING

IN testing steam supplies and fittings it was necessary to attach blank flanges to the inlets and outlets. This involved the tightening up and loosening of some hundreds of nuts in a day's work. Naturally, the time required was an expensive item in comparison with the price of the goods.

It had been the practise to use the standard nut, first tightening it up by hand and then using an ordinary wrench to complete the operation. This consumed considerable time in getting the nut started and turning it up over the length of the thread.

After giving the matter considerable thought, one of the most satisfactory changes made was to substitute in place of the standard nuts a supply of winged nuts made up special for the testing floors. These nuts were provided with two wings or projections on each side, extending about one inch in either direction. When these were added it was possible quickly to slip the nuts onto the bolts and then to twirl them

rapidly with the finger until they began to tighten up. The pressure of the thumb and fingers on the winged nuts enabled the operators to tighten up the blank flange and gaskets sufficiently without having to use the wrench except occasionally.

In many other testing operations of this kind or where nuts are pulled up for temporary holding purposes as in construction work and similar jobs, a great saving in time can usually be effected by making use of winged nuts instead of the standard square or hexagonal nut. N. Y. I.

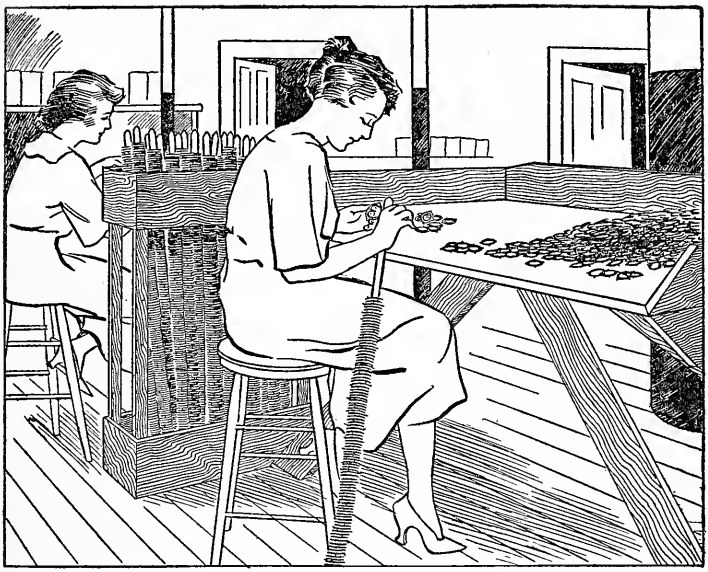
### WHERE BROOMSTICKS SAVE MONEY

THAT the assembly of small parts is work which, unless laid out with the greatest care, wastes an enormous amount of time, was particularly noticeable in the Victor Gasket and Manufacturing Company. Here it is necessary in the assembly of gaskets to put an asbestos ring with each copper ring.

It has long been the custom to do this by laying out a number of the copper rings and then putting an asbestos ring in exactly the right place on each one.

The same work is now done by dropping on a long rod, similar to a broomstick, the copper rings and the asbestos rings alternately. A cross-piece at the bottom of the pole keeps them from sliding off. When the rod is full it is shaken back and forth, and, as the rod is about the diameter of the holes in the rings, the asbestos pieces are easily shaken into the right position on the copper rings, so the work at the next operation is facilitated.

The rods are stacked in a rack as each one is filled. These racks may be seen in the background of the illustration on the opposite page. When a sufficient number of these racks are completed, they are loaded on a truck for transportation to the next operation.



A CHEAP ROD AND ITS VALUE

Less time and labor is required than before these rods were used, when the rings were assembled by pairs on the tables

This method of handling the work has reduced the number of girls who were formerly required to perform this operation. J. E. H.

SUPPLYING DRIVERS WITH MAPS

ONE shipping clerk realized that from 10% to 15% of his truck drivers' time could be saved if the drivers followed the most logical and direct routes in making deliveries and collections. Therefore, he hit upon the scheme of laying out their work for them.

From a local stationer he secured a supply of cheap outline maps of the city, showing the various streets and avenues. Each day the shipping clerk or one of his assistants would take one of these maps, and mark on it, in red or blue crayon, according to whether it was

a delivery or pick up, the various stops which the truck was to make. The route which the truck could use to best advantage in covering the ground was then indicated by a continuous line. The drivers were in sympathy with the new plan and used the route charts because it made their work easier for them.

While the marking up of these route charts on these simple outline maps of the city undoubtedly takes time on the part of the shipping-room force, when it is considered that the average motor truck represents an outlay of anywhere from $20 a day or upward, it will be appreciated that 10 or 15 minutes spent in securing the maximum service from it will be an excellent investment. W. B. S.

### SAVING TIME, SHOE LEATHER AND CONFUSION

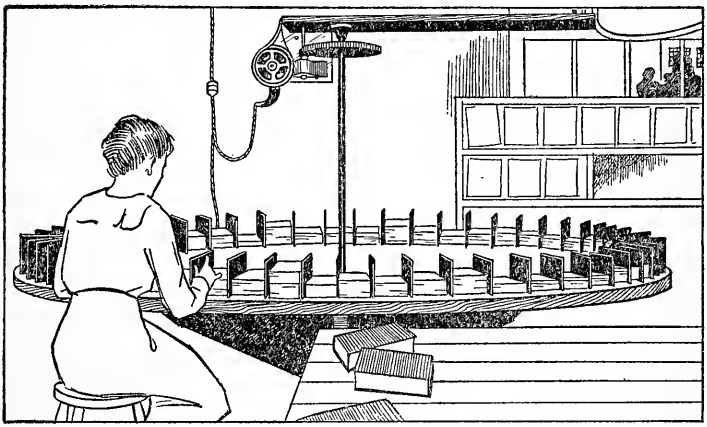
IN the collating of loose-leaf price book sheets one manufacturer formerly had the separate sheets, totaling about 240, stacked in separate compartments of long racks. Girls walked up and down the aisles between these racks taking a leaf from each compartment. At the end of a complete journey a catalog would be ready for the binders, with all pages and sectional dividers in place.

This same method is often used when the number of catalogs going out is small. When a large quantity must be made up it requires a greater number of girls. Also to do this work each girl must walk continuously.

To overcome these objections a simpler and quicker method was finally devised. While this is used especially for making up the sectional catalogs which contain various quantities of sheets, from about 16 to 60 pages, a larger number can be handled by collating them in sections. The equipment used for this requires fewer girls and eliminates tiresome walking.

Here a circular counter or shelf revolves about a perpendicular axis. On this are placed small metal partitions separated just far enough to accommodate the catalog sheets.

A small electric motor mounted on the ceiling drives the revolving counter through a train of gears, and is started and stopped by a push button switch. The



HERE THE WORK IS BROUGHT—NOT WALKED AFTER
The revolving table—turned by a button-controlled motor—brings each sheet before the operator in its proper sequence

speed is such that it requires a little less than two minutes for a revolution.

Perhaps a similar circular table can be used in other plants for gathering small parts or for packing, or even in some cases for an assembly job. R. V. W.

## HURRYING OIL WITH HEAT

"MOLASSES in January" may soon pass as a phrase connoting slow flow, for electric heaters of the immersion type are now being applied with success to hasten the flow of liquids that become viscous at low temperatures.

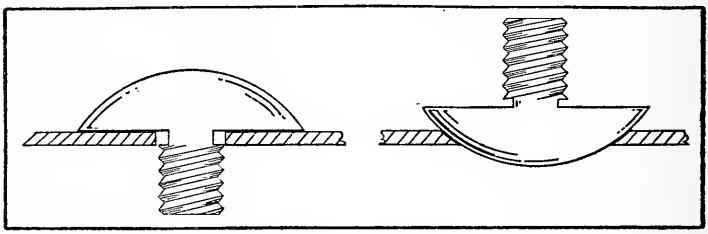
This method has been applied to hasten the unloading of tank cars of oil. It releases the car sooner, saves demurrage charges, and is free from fire risk.

Similarly it has been applied to accelerate the handling of cocoanut oil in tanks and barrels. G. H. T.

### MAKING WORK EASY TO HANDLE

IN any plant where it is the purpose to cut down all useless motion, full advantage is taken of the natural shape of the materials and articles that are to be handled. An example of how time may be saved by following this principle was brought out in a motion-study campaign in one machine-manufacturing plant.

In one of the departments of this factory there were several machines that worked on brass noses which



TURNING OVER SAVES TIME

When put in the tray nose up, this brass part was difficult to grasp. Nose down, it is easily and quickly handled

were about the shape of a large-headed rivet with thread on the shank. These brass pieces were carefully machined and the precision of the work demanded that they be handled with the utmost care. For this reason a tray was made to handle 16 at a time. Holes were bored in this tray so the noses could be set in with the shank extending down through the hole, as shown in the left-hand part of the sketch reproduced above.

When this plan was put in practise, however, it was found that with these brass pieces covered with oil, every time a workman wanted to pick one up he wasted several moments—it was impossible to get hold of the piece quickly.

The situation was overcome by enlarging each of the holes in the tray so that the nose could be set in head downward, as illustrated on the right-hand side of the sketch. Then it was a simple matter to handle the pieces with all the care and speed that was necessary. W. A. H.

## PASTING LABELS WITHOUT SOILING

THE package in which many products leave the factory must be labeled. This ordinarily is done by means of pasting or gumming a paper label to a bottle, box or carton.

In one chemical works, much of the product of which is packed in bottles and small pasteboard boxes, it was originally the custom to buy gummed labels. This, however, was expensive, so it was decided to paste the labels upon the packages.

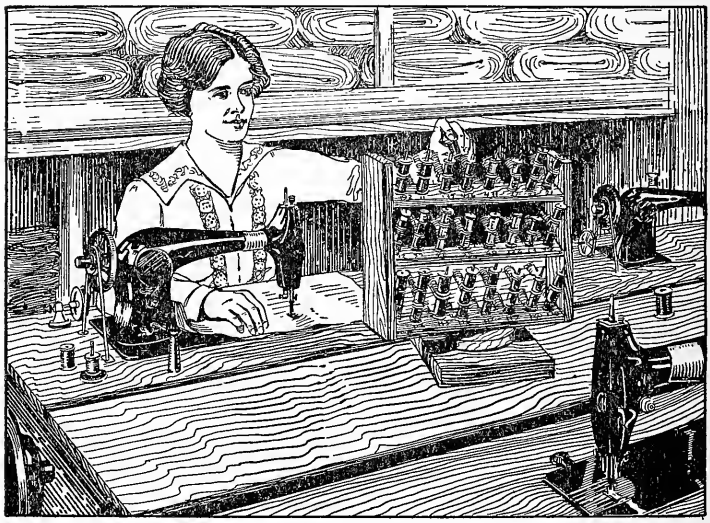
When paste was first used the girl who did the labeling coated each label separately. It was found that this was a slow process, although much cheaper than the use of gummed labels. Now the labels are coated with paste in a manner which has made a very marked saving.

Paste is applied to a board by means of a brush and the labels are laid upon this. Sufficient paste adheres to the label when it is picked up to hold it firmly to the box. The method is neater and more rapid than the old plan, as it is practically impossible for paste to get on the wrong side of the label and make a bad-looking job. In addition, the coating is found to be very uniform. J. H.

### THIS RACK CUTS WASTE

IN one shop, every job specification provides for a certain number of thread to be used throughout the manufacture of the garment. Formerly all sizes and colors of thread were supplied to the sewing-machine operators in piles placed at intervals along the tables.

But this method was wasteful. Each time an operator wanted a certain size thread he had to hunt through



**AN HOUR OF THOUGHT PRODUCED THIS COST SAVER**

Some scrap lumber, a few nails and an idea; that is all that was necessary to make this thread rack that has paid for itself many times over. It promotes accuracy of selection, quickens the work, and reduces the waste of material

this confusion of spools. Often he would be unable to find what he wanted. At times it was not there. When all sizes were thrown together in one pile it was impossible to check up on the supply.

The outgrowth of the apparent necessity for improvement was the rack illustrated above. This

device is entirely home-made, designed and built right in the factory from material on hand.

A bolt connects the base and the rack proper, so that the rack or shelves can be rotated at the convenience of the operator. The heads were cut off of different-sized nails, which were then driven into the inclined shelves to serve as pegs for the spools and bobbins. Marked on the wood by each peg is the number of the thread to be placed on that peg. To avoid confusion, these numbers are arranged in the order determined by the general run of work as being best suited to the needs of the operator.

The whole rack is of such a size as to be conveniently placed on the table, within easy reach of three or four operators. Every morning a boy comes around and replaces the spools which have been used the day before. So the thread is always there and quickly obtained in the proper shade and color.

The cost of the rack is chiefly the labor of knocking it together, an amount so small that it is soon covered by the time saved at the machines. S. A

### MAKING REPAINTING UNNECESSARY

WITH one company building a line of machinery and equipment it was customary to make up a number of machines for stock purposes. Also many completed machines built on special orders were held up after completion, due to shipping embargoes, incomplete stage of the plant in which they were to be installed, and similar difficulties. While awaiting shipment these machines were stored in an outside shed which exposed them to slight exposure and weathering.

It had been the custom of the shops to fully complete all machines on the erecting floors, including painting. It was found, however, that in the case of the machines

that were built for stock, or machines on which immediate shipping orders were not available, that after standing in the storage shed for a few weeks it was necessary to repaint the equipment in order to brighten it up. This, of course, involved extra time and labor which on some of the machines amounted to an appreciable sum.

In view of this necessity for repainting, instructions were issued that all equipment, which was made for stock purposes or on which immediate shipping instructions were not available, should be placed in the storage shed without painting. The painting operation was held up until the apparatus was ready to go forward for shipping. Besides the saving in paint, this revised practise relieved the hard-pressed painting and shipping force of considerable extra work. Where this is not practicable it may be feasible to at least leave the final finishing coat until later. W. B. S.

### USING GAGES ECONOMICALLY

IT frequently happens that a scarcity of tool- and gage-makers makes it necessary to use only one set of gages for six or seven sets of tools, all running on the same job in as many different machines.

In order to get the best possible results from one set of gages, and also to prevent loss of time in looking for them when they are not in use, one eastern concern has adopted the following plan:

The set of gages which is available is always kept upon the gage hook of the center machine. For example, if there are seven machines running on the job, the gages are hung on the hook on number 4 machine. This keeps them within convenient reach of all seven machines and is perhaps as good an arrangement as can be made where only one set of gages is available. T. U. C.

### HOME-MADE MOUNTING FOR STUDDING TOOL

COMPRESSED air drills are used for putting studs into the cylinder heads of tractor motors at the plant of the Allis-Chalmers Manufacturing Company. This was formerly done by hand and it required about three quarters of an hour to insert the studs into one cylinder head. Now the job is accomplished in about 15 minutes. In order to apply the compressed air drill to this job, one device for suspending the drill and another for holding the cylinder head were needed.

The drill suspension is made of pipes and pipe-fittings. The photograph reproduced on page 118 shows clearly how the suspension is effected. The long spring at the top of the photograph allows for the operator to press down on the drill as the stud is inserted. Then when the drill is removed, the spring lifts it up out of the way.

Another feature of this suspension frame is the coupling with holes drilled into it and pegs inserted into these holes. It is this coupling that makes it possible to swing the drill from one side to the other, and as the coupling works loose, it is tightened with the pegs seen in the picture.

To hold the cylinder head, a small dolly was made. This has a hanger into which the cylinder head can be clamped quickly. After the studs have been inserted, the dolly, cylinder head and all, is moved along the track to another position where the valves are ground into place. G. Y. B.

### HANDLING COAL CONTINUOUSLY

AS a result of their suggestion system, one of the employees in the paper manufacturing plant of the Chemical Paper Manufacturing Company suggested an extension in the chute leading from the top of number two coal bunker so that this chute now con-

tinues beyond the bunker down into the driveway outside of the boiler house. There is a shut-off gate pivoted at the conjunction of the number two chute with its extension, so that when the large bunkers are full, the coal may be directed into a truck waiting underneath the end of the extended chute in the roadway. The truck carries the extra coal to a storage pile. Of course, coal has to be sent to the storage pile only occasionally. But while the truck and men are working at this, they should be working continuously, not standing idle, while the truck is going to the pile and back. They found that by making the chutes of proper capacity and by putting in a sliding door at the end of the chute, as shown in the illustration on page 162, they are now able to operate the conveyor continually while the truck is going to the coal pile to unload. When the truck comes back half of the load is already waiting and is instantly taken aboard by a simple opening of the door. This saves considerable time.

It has been found in trying out this idea that three men, one truck driver, one man in the car, and one man to operate the conveyor, can unload a 50-ton car of buckwheat in one hour and ten minutes, or about 350 tons in eight hours. P. F. O'S.

### SIGNALS THAT PREVENT DELAY

ONE factory guards against serious delays with a plan by which the production man is notified at once of machine trouble. The repair department is then notified so the trouble is taken care of quickly and the machine operator loses little time.

Down in the production man's office is a board which carries a light for each machine in the shop. All machines are numbered, and when trouble develops the operator pushes a button located near him and this

causes the light under his machine number on the board in the office of flash. A clerk investigates the trouble at once and covers instructions to the repair department by means of a pneumatic tube.

The repair department has at hand complete information on all the machines and if the repair requires a new part the mechanic knows what to take with him. Often this foresight prevents a second trip to the repair room.

The prevention of serious hold-ups of a few important rush jobs has compensated for the cost of installing the plan. T. F. M.

### A PERPETUAL SORTING INDEX

ALL manufactured orders are collected in the McCallum Hosiery Company to a long bench which is divided into 100 compartments. These compartments are numbered in black figures on the front edge of the bench from 00 to 99. There are not likely to be more than 100 orders in the shop on any one day.

Parts of each order may be distributed to several workers or inspectors; part may be picked out of stock. As fast as each partial group is made or selected it is taken to the compartment which carries the same number as the last two digits in the order number. For instance, order number 8987 is collected to compartment 87. Tomorrow the order numbers may be in the 9,000's, but by that time today's orders will be gone and order number 9087 can occupy the 87th compartment.

This bench is along the outer wall of the stockroom, in a side aisle past the ends of the stock racks. The aisle starts from a door opening into the manufacturing department. Thus the bench is handy either for picking goods from the shelves, or for bringing in manufactured orders. Many goods are shipped without ever having been in the stock racks.

A ticket representing the full order lies in the compartment. As each succeeding part of the order arrives at the compartment it is checked off on the order form.

When the last instalment has reached the bench, the complete order is inspected for quality, style, numbers, sizes and quantity. While it is partially wrapped the ticket is sent to the shipping room office to have the invoice bills and shipping tag made out. Providing a fixed spot like this, where the component parts of orders can be brought together, helps control the day's output. P. F. O.

### SAVING WASTED PHONE TIME

ANALYSIS of wasted time in his department proved to one Western Electric executive that his men spent entirely too much time answering or instituting phone calls. It was very necessary for each man in the group to keep in close touch with the one or two departments for which he supplied information. Yet, in spite of the dozens of calls per man per day, only four men out of sixteen had a phone within reach of his arm. The others were obliged to jump up from their chairs to answer, or to call. This accounted for most of the wasted time.

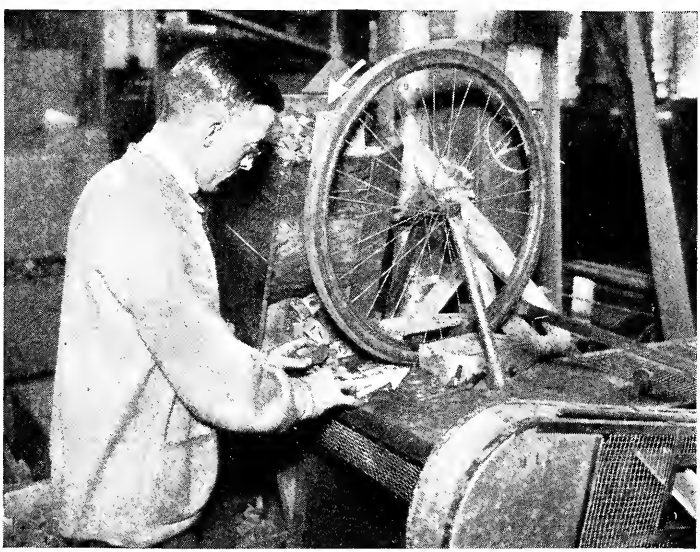
The desks were at once rearranged in groups of four. On the corner of one desk, where the four desks met, a standard extension arm was erected, and the phone already in use fastened to the arm. This arrangement made the one phone available for four men who could reach the standard, swing the arm around, and answer or institute a call in a tenth of the time formerly required. In addition to the actual time saved, the men are much pleased at the thoughtfulness of their superior in saving them so many steps. Altogether the saving each day is worth much more than the price of the equipment. T. W. A.

EACH BOLT SLIPS INTO A HOLE

To facilitate painting the heads of small bolts, one factory uses this perforated rack. See page 123 for item

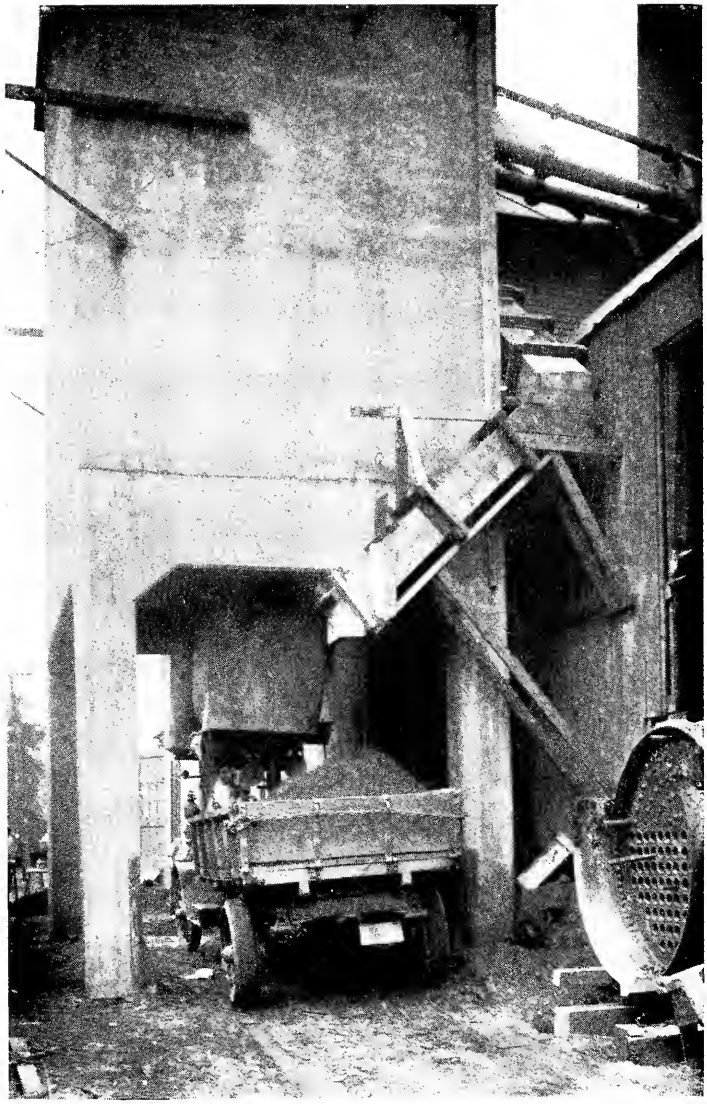
PARTS ARE COUNTED BY "FIVE'S"

The small carton in the rack must be filled with exactly 100 of the small parts. See page 121 for item



THIS WHEEL HOLDS THE WORK

Cutting small pieces usually entails danger of accident. By grasping the wheel on top, the work is fed to the cutter here without danger. See page 124 for item



THIS CHUTE STORES COAL

When more coal is being delivered to the bins than they can hold, the excess passes through the chute into a waiting truck that carries it to the storage pile. While the wagon is away, the chute fills up ready to discharge as soon as the truck returns. The process is thus continuous. See page 157 for item

### HOW TO PLAN YOUR ROUTING

CONGESTION of the streets is an important factor in route planning and should be given careful consideration. In most large cities a traffic census is taken from time to time, giving the number of vehicles which pass certain points during slack and busy hours.

Condition of roads also has had a decided bearing on routes, and often it is wiser to travel two or three extra miles in order to avoid a bad stretch of street. Wise shipping superintendents keep all such information in plain sight, where the drivers cannot overlook it. One man keeps at the side of his desk a large-scale city map on which he marks with colored tacks and slips of paper the main thoroughfares and street intersections—white for those to be used, red for those to be avoided. A blackboard is also employed to bulletin especially bad road conditions as they are reported by drivers returning from their trips. Some owners issue positive orders that their trucks shall never leave the paved streets, and use their horses and wagons to cover the rough roads. O. R. B.

### LOADING CARS QUICKLY

HERE'S the problem that confronted the manager in one plant. The spur of the railroad where the cars from this plant were loaded was several hundred feet from the plant itself.

In trucking the material from the plant door to the car it was necessary to stop the truck at the car door. There several men were kept busy lifting the goods, one piece at a time, from the truck into the car.

This condition was vastly improved by a little tinkering with an elevating machine that was placed in location at the car door. The arrangement works this way: The steel platform of the elevating machine can be lowered to within 10 inches of the ground. Therefore

a steel approach from the loading platform to the elevating machine permits trucking onto the elevating machine quite easily. There is a hinged sliding platform that connects this same elevating machine platform with the car, so that the goods can be raised to the level of the car floor then pushed on board along a level run-a-way.

The same idea may be worked out in other plants where loading facilities commonly mean too much man-power for economy. B. L. B.

### PLATTING THE FACTORY FLOOR

THE manager of a factory that had been having some difficulty in moving materials in the shops platted the entire floor space into numbered blocks. Streets and avenues divide the blocks and provide aisles for the shop trucks.

The truckers know the location of all blocks by numbers and move material about the plant without any delay or confusion. All route slips or orders to move material show the number of the block from which it is to be moved and the number of its destination block. This method has greatly systematized the routing of trucks and has helped in many ways to increase the shop output. H. O. B.

### HOW SOUNDPROOF OFFICES HELP

EVERY shop superintendent or manager connected with a manufacturing establishment where noisy operations must be carried on, as in a boiler shop or rivetting room, can appreciate the difficulty in talking to foremen or issuing instructions, with this excessive noise. Usually it requires yelling at a high pitch, which often leads to misunderstanding and mental irritation.

The shop superintendent of a large concern building power machinery experienced this difficulty in the

boiler shop of his plant. In order that he might talk to his foremen without such great effort he arranged to have four practically soundproof offices placed about the shop. When he desired to discuss any blueprint or any instructions with the foremen or workmen they could retire to the soundproof box and carry on their conversation in a normal way. These little offices were made of double partitions, very much like telephone booths.

Some such arrangement as this ought to work out to advantage in most any factory where there is excessive noise. J. N.

### WORK BOXES THAT FORM A BENCH

WHERE a roomful of employees work side by side on goods which each one carries through to completion, it has been found of value to supply each with a separate place to keep the work overnight and through the lunch hour. Such storage is very compactly provided in the embroidery department of the McCallum Hosiery Company's factory. Also, in this instance, each girl must have a work bench, where she can conveniently lay out all her work when necessary.

To meet this need, the work boxes for several girls are set up in a row on stanchions. When closed, the top of each work box, together with the tops of the adjacent boxes, forms a work bench. Each box is 18 inches long, 8 inches deep, and 10 inches wide. A row of them looks like a long narrow table in sections, with the top of each section hinged to lift like a cover.

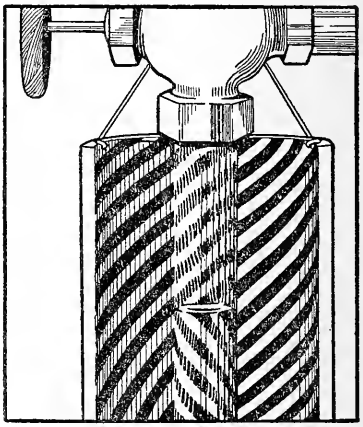
In the box the girl can keep her material and needles. Each box is fitted with a small lock so the owner is sure her work will not be disturbed before she is ready to take it up again. Embroidery is done by hand and no girl's work is dependent upon any other girl's, any more than if they were each of them at her own home.

This part of the factory is simply a work place, not a machine room. Most of the time a girl can work in any part of the room.

E. H.

### READING WATER GAGES EASILY

IN the power plant of the General Electric Company at the Schenectady works, the engineers are using a particularly ingenious device—it's a new wrinkle in water gages. At the best, gages get dirty some times and even when they are not dirty, either escaping steam or inconvenient levels make it difficult to tell just exactly where the water level in the gage does stand.



YOU CAN READ IT AT A DISTANCE
The stripes reverse their direction when observed through the water leaving a clean cut line at the water level

In the case of this plant a cylindrical piece of asbestos striped as shown in the illustration at the right, is used for a background. The refraction quality of the water in the glass completely reverses the direction of the stripes—making a definite line of demarcation at the water level even though the gages are more or less dirty and considerable steam is escaping.

Engineers have no difficulty whatever in reading the gage from a distance. It gives them much more accessible control of the boilers, making for added safety and also a saving in time.

S. R. T.